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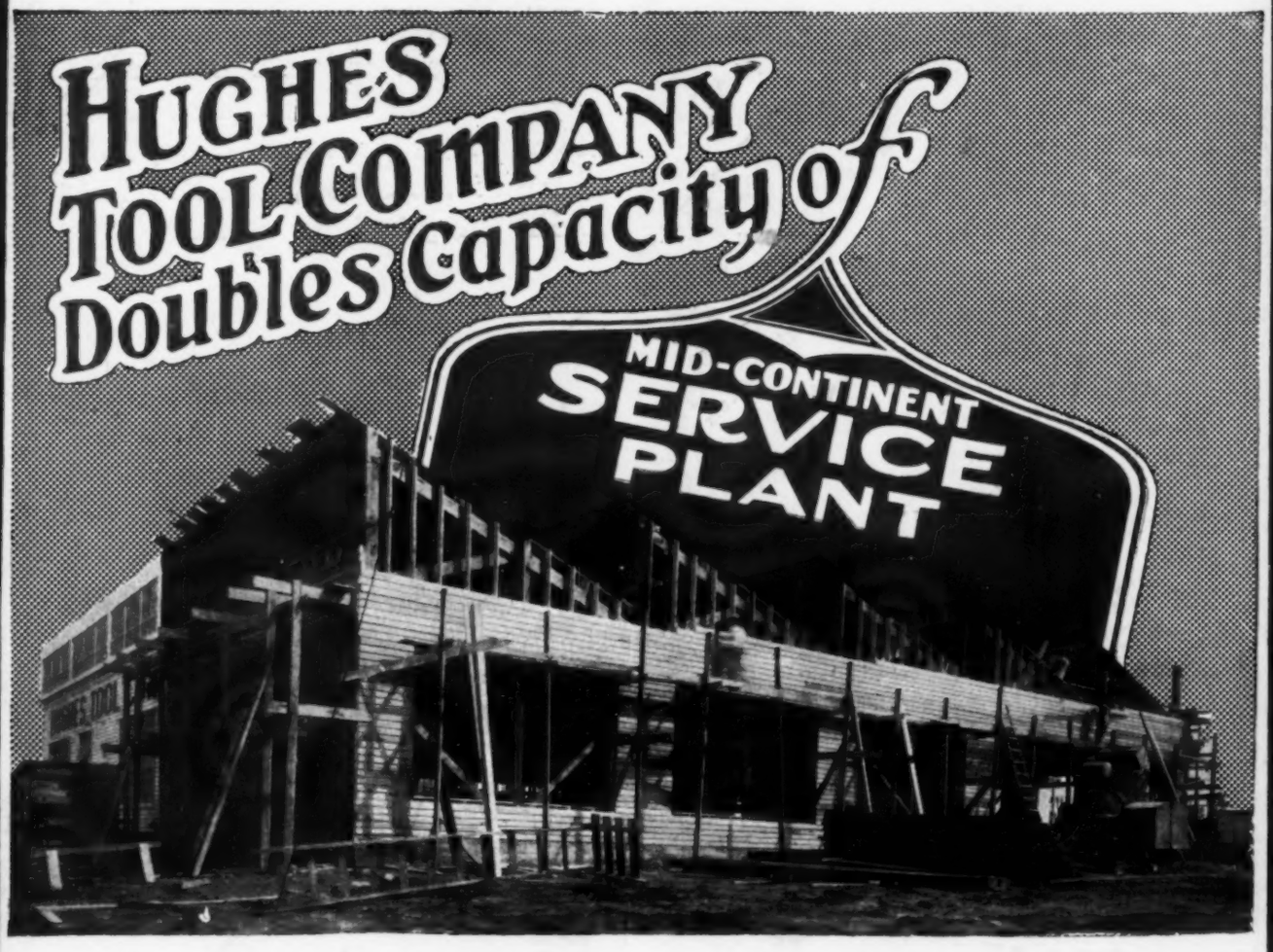
The OIL WEEKLY

October 22, 1926 Volume 43. No. 5



The above illustration shows the construction of 100% shop space being added to our Oklahoma Service Plant. Equipment for this addition has already been purchased and much of it has arrived at the plant. With the additional buildings and equipment we will be able to give a quicker service on the repairs to rock and disc bits, and on the recutting of cones.

It is not practical for the Hughes Tool Company to put a shop in every oil field, and hence a large shop has been centrally located at Oklahoma City; a similar plant is located at Los Angeles, California.

HUGHES TOOL COMPANY

Service Plants: Los Angeles, Calif., Oklahoma City, Okla.

Main Office and Plant: HOUSTON, TEXAS

Export Office: New York City, N. Y.

Spang Drilling Jars! Thrive on Hard Work!

Hard lime, sand and cavey formations mean nothing to SPANG JARS. They're built to withstand the most difficult drilling conditions.

The repeat orders of hundreds of progressive drillers throughout the oil country are convincing evidence of the satisfaction SPANG JARS bring to their users.

Try them—you'll never use any other jar in the future.

Spang Weldless Jars are stocked by over 300 Supply Stores — buy them from your nearest supply house.

SPANG Thread Protector

Protect your Tool Joints with SPANG Thread Protectors.

Like all Spang products they guarantee absolute satisfaction and long, durable service.

Spang & Company

Butler, Penna.

Sold by all Leading Supply Companies

The OIL WEEKLY. Issued weekly by the Gulf Publishing Co., 1716 Dallas Ave., Houston, Texas. Subscription price $1.00 per year; 10 cents per copy. Entered as second-class mail matter December 23, 1916, at the post office at Houston, Texas, under act of March 3, 1879.

Congratulations

Miss Tulsa—
Queen of Beauty, High Priestess of Pulchritude
—we salute you!

We salute you as fellow Tulsans, proud of the honor you have accorded us.

Fig. 601.

Knowing something of the merits required to forge ahead in the face of strong and worthy competition, we salute you with a full appreciation of your accomplishment.

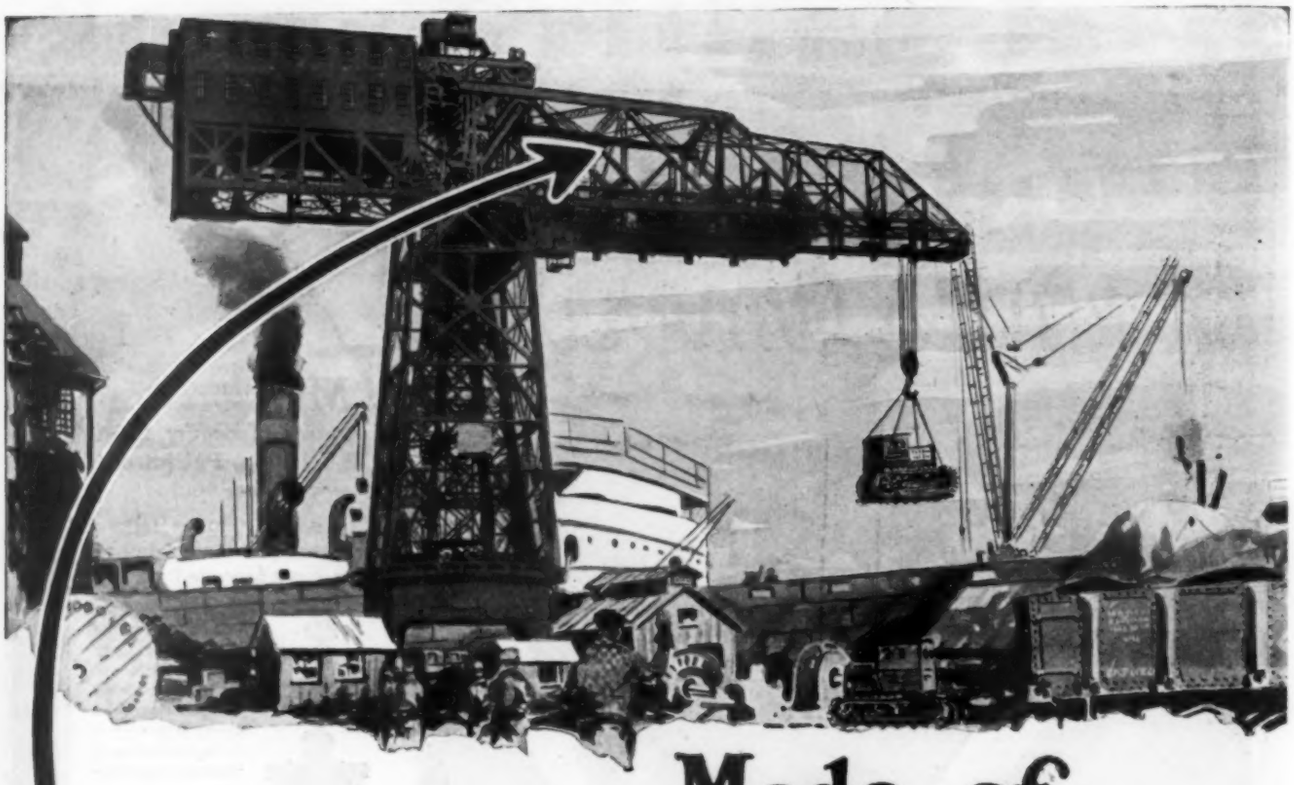
To win in a local bathing beauty contest is honor enough. To be a victor in a nation-wide contest of victors is a tribute that comes to few.

Fig. 604.

Figure 601—[450 to 600 pound pressure] a sturdy pump designed for oil or water service. Extra long stroke gives straight line pull; practical absence of gasket surface adds to long, trouble-free operation.

Figure 604—Gaso Walking Beam and Power Pump for gas or vacuum. Constructed to stand world of abuse. For taking gas from pumping well or putting vacuum on well.

GASO PUMP & BURNER MFG. CO.
Tulsa, Oklahoma



Made of Structural Steel

WHY?

Fifty tons swing out on the long arm of a balanced crane! Think of the stress and strain imposed on the whole structure when the load has such enormous leverage! But it's safe, and the men operating it are safe, for with STRUCTURAL STEEL construction its designers have accurately computed the abilities on every beam, upright and cross-member.

The economy, safety and computable strength per square inch, prompted International "IDECO" to choose structural steel for its derricks.

"IDECO" is probably the only company in the world whose rigs are scientifically designed and engineered so that their strength is a known quantity. They are the Standard of Comparison.

INTERNATIONAL STEEL (IDECO) DERRICKS
(GALVANIZED)

The International Derrick

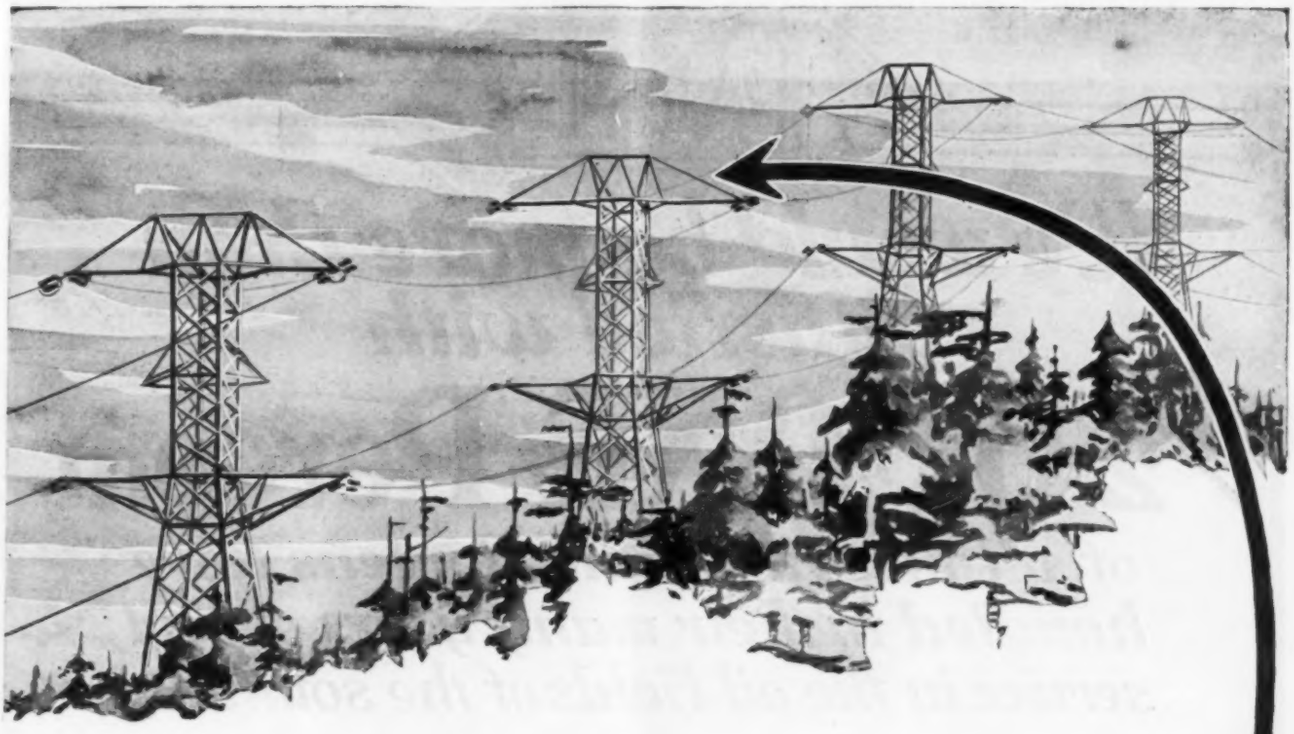
Columbus, Ohio

Dallas, Casper, Eldorado, Kans., Denver, Bakersfield, Wichita Falls, Drumright, Tonkawa, Amarillo, Seminole, Okemah

California Representative:
EXPORT
30 Church St., New York

Columbus, Ohio

The largest company devoted exclusively equipment for the oil,



Made of Structural Steel

WHY?

High Tension Transmission Towers are built to do two things well—carry the load of heavy wire, and stand up under years of "weather." These towers are not made of wood, nor wood and metal, nor pipe. They are exactly the same construction as "IDECO" Steel Derricks—First Grade Galvanized Structural Steel! This type of construction is the only practical one and is in use throughout the world for all permanent load carrying towers.

Can you afford to use anything inferior for your "bread-winner"—the derrick?

INTERNATIONAL STEEL IDECO DERRICKS (GALVANIZED)

and Equipment Company

Torrance, California

Tulsa	Wewoka	Houston
Oil City	Corsicana	Smackover
Los Angeles	New York	Mexia
Panhandle	Shreveport	

National Supply Co. of Calif.

Representation:

Los Angeles San Francisco Houston

to the manufacture of steel (Galvanized) gas and artesian industries.

LAYNE

We would be more than satisfied with

½ Of ONE Percent

of all the Oil Layne Screens have handled in their many years of real service in the oil fields of the southwest

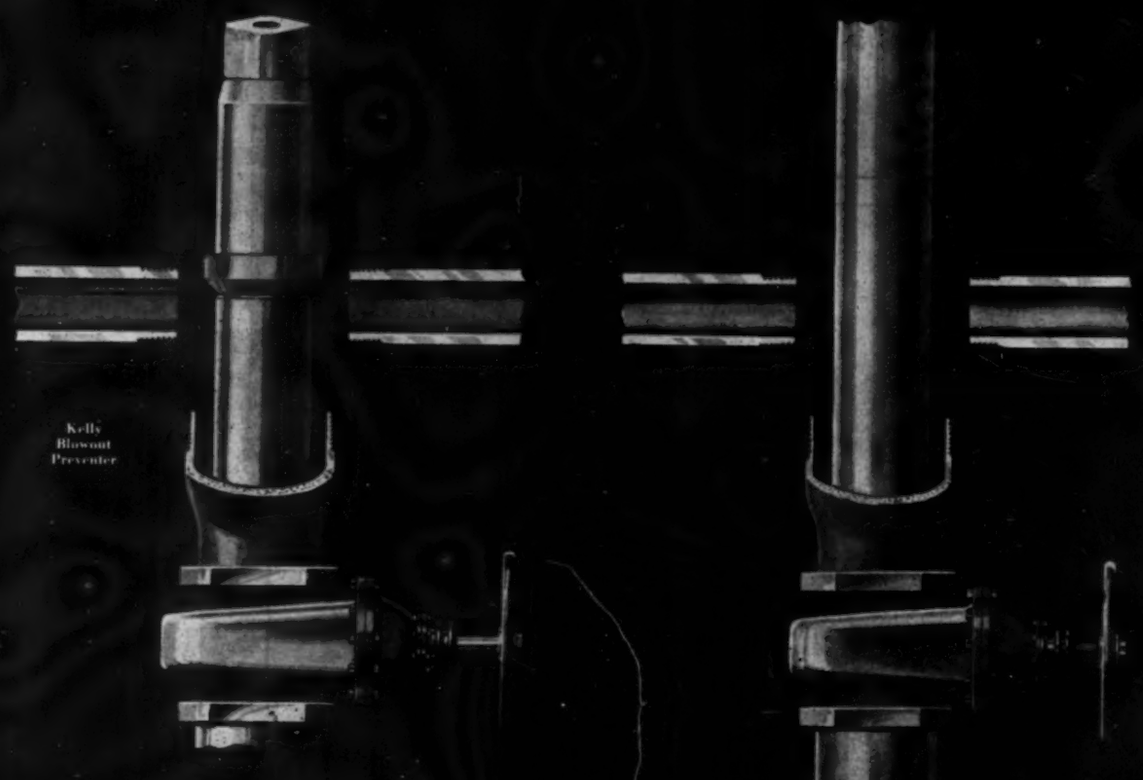
GET MAXIMUM RESULTS

with the LAYNE SCREEN

—Use **the** service with a quarter of a century's **experience** in meeting screening problems.
—Plant production able to meet your emergencies.

Just Write, Wire or Phone

The Layne & Bowler Co.



Regan Drilling Blowout Preventer

When pressure is encountered while drilling, the kelly is raised and the sub at the bottom of the kelly compresses the packing ring in the body, making a positive seal. This enables the operator to mud off pressure.

This is the only blowout preventer that does not depend upon the weight of the pipe to form a seal—an added advantage where gas pressure is struck at shallow depths, and where the weight of the pipe is insufficient to pack off pressure.

If a blowout occurs while pulling drill pipe, a split packing ring is inserted in the body and a packing gland is screwed down, forming a tight positive seal around the pipe. The kelly can then be attached to the drill pipe and the slush pumps used to kill the pressure. This head can also be used when setting casing.

Regan

Forge & Engineering Co.

San Pedro California

HOUSTON, TEX. TULSA, OKLA. NEW YORK CITY. TAMPICO, MEX.

[DUNN TOOLAGRAM]

Dunn Safety Tubing Bleeders

Chanslor-Canfield Midway Oil Company

C. L. MOORE, Engineer

MIDWAY DISTRICT

P. O. Box H

R. M. SMITH, Superintendent

C. D. RUMBOLD, Chief Clerk

Fellows, Calif.

June 7th, 1926.

Dunn Manufacturing Co.,
Oxnard, California.

Gentlemen:-

During the last two months we have installed some of your Dunn Tubing Bleeders, and at the present time have 28 in use, and every one has worked perfectly in every instance, in fact, during this period, we have used them in bleeding tubing 117 times, and they have worked perfectly every time.

We are arranging to put in about 275 more until practically all our wells are equipped with them, as we find the time saved on each tubing job, that is, the difference in time put in pulling the well wet and the time consumed pulling tubing after bleeding, amounts to about two hours' time saved on each job, not to mention the oil saved, the elimination of the waste of oil around the derrick, the insuring of a dry clean job and safety to the men; and I feel sure this company is going to put them on in the other districts as soon as I convey this information to them.

Yours truly,
R. M. Smith
Superintendent.

RMS:G

FREE TRIAL: To properly demonstrate the merit of this device we will supply any reputable user with any size desired, freight prepaid, for trial. If not satisfactory, return at our expense.

OIL WELL PATENTED DUNN TOOLS
TRADE MARK REG.

"work perfectly every time."

DUNN
MANUFACTURING COMPANY
OXNARD, CALIFORNIA

Mid-Continent Branch Warehouse
215 East Archer St. Tulsa, Oklahoma

Export Sales Office
150 Broadway, New York City

SIVYER S CASTINGS
DEPENDABLE

The crown-block illustrated is fitted to the top of this gin-pole to hold the guy wires and prevent the pole from splitting.

Gin-pole crown-block cast in Sivyer Electric Steel.

Machining and Grinding Tools Tell the Cost of Extra Smooth Finishes

Many manufacturers are forced to provide castings with an extremely smooth finish. The gin-pole crown-block, shown above, is ground by its user until it has almost the appearance of plated steel. After that it is given several coats of paint. Unless a casting is free from surface sand the cost of such dressing up becomes excessive. Surface sand, even though unnoticed by the eye, plays havoc with machining and grinding tools—and sends them on frequent trips to the tool room. And that is another reason why manufacturers who must have unusually smoothly finished parts turn to Sivyer Electric Steels. With sand-free Sivyer Castings machining and grinding costs are not excessive—and Sivyer Steel provides the sound interior strength that must be beneath the smoothly finished surface.

The sharply varying sections of such a casting as the one shown are breeders of "shrinks"—and "shrinks" cause failure in service. To our knowledge, not one casting — of the type shown on this page—has ever failed in service. If you're troubled with high machining costs—or if you demand better service from your castings in the field, we will make recommendations without obligating you in any way. Just *Send Blue Prints of the Job.*

SIVYER STEEL

SIVYER STEEL CASTING COMPANY, MILWAUKEE

Mid-Continent Office: 1415 F. & M. Bank Bldg., Fort Worth, Texas

Say you saw it in The OIL WEEKLY

MASTERPIECES OF FORGING

CHRISTMAS TREES THAT DO NOT REQUIRE NIPPLES

FORGED from one solid piece of 45-point carbon steel, "Gulfco" Christmas Trees are threaded with male threads and eliminate four chances of "leakage."

—They are tested high enough to stand any pressure that the control valves can stand, and are tougher than pipe itself—a notable contrast to the old-style "cast" christmas tree cross.

—They are so compact that it is not necessary to "crib up" derricks to set them below the floor; saving hours of valuable time on the derrick floor.

"Completely Ready to Use the Minute They Arrive"

GULF COAST MACHINE & SUPPLY CO.

HOUSTON, TEXAS
316 West Bldg.

BEAUMONT, TEXAS
305 Orange St.

GULF CO
PRODUCT

Say you saw it in The OIL WEEKLY

Before they "rolled their own"

LADIES were ladies in those days—their complexion, while sometimes a trifle sallow, at least did not resemble a kalsomined and decorated egg—but that's a long time ago—thirty-two years to be exact.

And that's when fieldmen first used Jones Sucker Rods—the best then—the best now—made by a firm that sincerely strives to make a better product—Jones Rods will always be far superior to the "just as good."

Specify Jones Forged End Rods—the Giant and Perfect—and get the finest, strongest rod in the world.

S. M. JONES COMPANY, Toledo, Ohio.

JONES SUCKER RODS~

Speed+Safety +a clean-cut job = The New SMITH UNDERREAMER

When this new perfected roller cutter expansion rotary underreamer gets on the job, even the most hard-boiled skeptic has to sit up and marvel.

Its speed is unequalled and it gives clean-cut work right to the bottom without any re-underreaming. Its circulation is positive and thorough keeping the cutters washed clean at all times. You "run-in" the liner clean to the bottom with no fuss or muss.

Write for the new folder which minutely describes and pictures this new underreamer that causes so much favorable comment wherever used.

H. C. SMITH MANUFACTURING COMPANY
Whittier, California
Branch Office and Warehouses:
Taft, California — Ventura, California
Harry B. Shine, Sales Agent, 2408 McKinney Ave., Houston, Texas
R. D. Mumford, Factory Representative, Amarillo, Texas
ALL SUPPLY HOUSES

What a Cement Barrel MUST do!

1 MUST set the cement in every hole at ALL points.

2 MUST be Absolutely dependable under ALL conditions.

3 MUST be rapid—economical.

4 MUST relieve the casing of all strain.

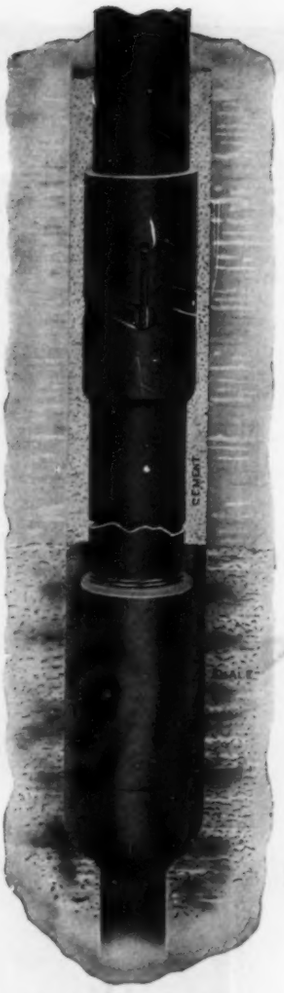
5 MUST center faultlessly with equal space on all sides.

6 MUST always prevent cement from backing up in casing.

7 MUST eliminate all risk of parting.

8 MUST take weight off slips when setting casing at bottom of well.

These are some of the virtues of The Crowell



Patents Pending

Makesure Cement Barrels are built in size 4¾" up to 12¾". Send for catalog which gives full particulars together with prices.

Makesure CEMENT BARREL

Lorraine Built

This is the cement barrel guaranteed without question or quibble to make your cement work 100 per cent satisfactory

THE LORRAINE CORP.

P. O. BOX 901-R.R.3 — MANUFACTURERS AND DISTRIBUTORS — Phone Compton Main 116-R

OIL WELL SPECIALTIES

110½ and Alameda Streets

Los Angeles, Calif

Oklahoma Branch:
The Lorraine Corporation
406 West First Street,
Tulsa, Oklahoma

Export Distributors:
Buck & Stoddard
25 Broadway
New York City

Arkansas Branch:
Crowell Bros., 523 S. Washington St.,
Box 1796, El Dorado, Arkansas

endable pplies and ervice

Stocked for Immediate Shipment

Dodge Mfg. Corp. Transmission Machinery
Whitlock Rope

Beaver, Toledo & Oster Stocks and Dies;
Rubber and Leather Belting and Packing.

Also Mill Supplies and Heavy Hardware
Drill Pipe, Line Pipe and Casing

Write, Wire or Phone Your Needs

NORVELL WILDER HARDWARE CO. — QUALITY AND SERVICE

NORVELL WILDER HARDWARE CO.

BEAUMONT HOUSTON SHREVEPORT FORT WORTH

WORLD LEADERSHIP

Since the Tret-O-Lite Process (the chemical process) for treating "cut oil" was perfected by William S. Barnickel, in 1913-1916, it has become the world's leading method for treating petroleum emulsions.

Hundreds of millions of dollars worth of oil have been reclaimed by its use.

It has saved hundreds of valuable wells from total loss.

It has saved many small producers from financial ruin.

It has saved more oil for the large producers than has any other discovery of recent years.

It has saved whole fields.

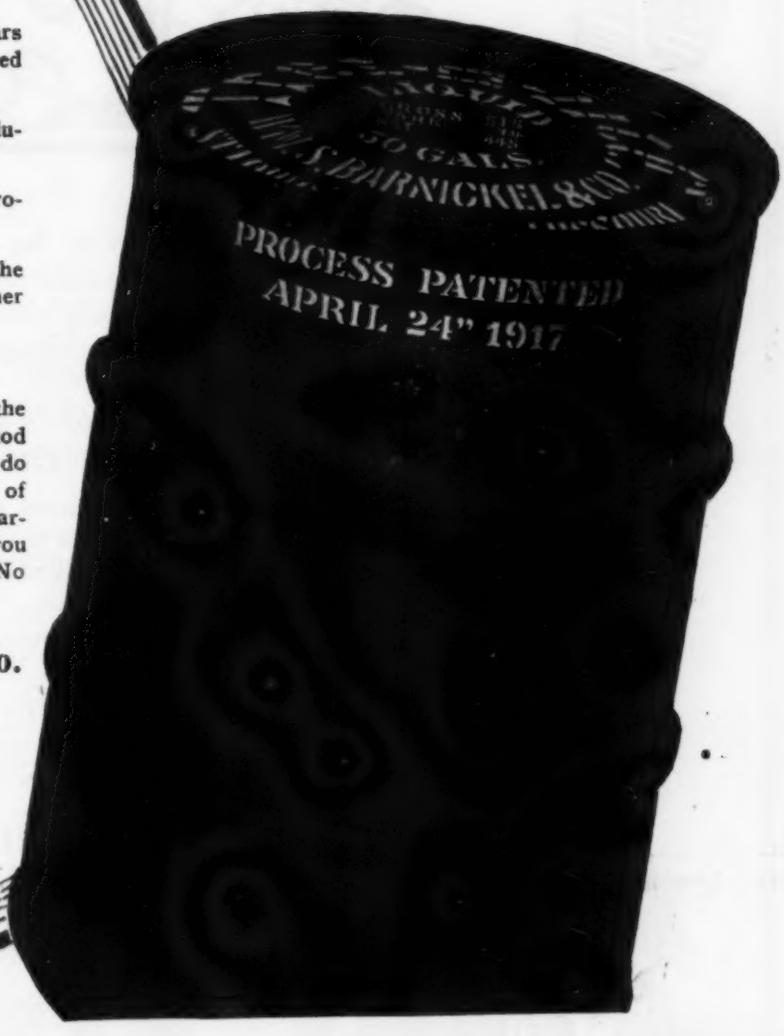
In so important a matter as the selection of the correct method for treating your emulsions, do not act without full knowledge of the facts. Let us send our nearest field expert to explain to you fully the Tret-O-Lite Process. No obligation.

Wm. S. Barnickel & Co.

St. Louis, Mo.

Offices and Plant:
Webster Groves, St. Louis County, Mo.

Process Patented



Tret-O-Lite

Reg. U. S. Pat. Off.

THE OIL DOCTOR SAYS:

"Investigate!"

"Just think where the oil industry would be today, if far-sighted, hard-headed pioneers had not investigated scientifically correct money-saving equipment such as Electric Dehydrators.

The complete success of "Petreco" Dehydrators

in recovering oil from the emulsion and restoring the entire production to the gravity it should show as clean oil, is proved by the scores of producers, noted for their efficient and economical production, who are using this money making equipment as fast as they can install it.

"Investigate!"

Have us mail you our newest booklet—"The Electrical Process for the Dehydration of Crude Oil Emulsions." It will show you the way perhaps to bigger dividends.

PETROLEUM RECTIFYING COMPANY OF CALIFORNIA

308 Union Oil Building
Los Angeles, Calif.

336 Humble Building, Houston, Texas.

Proved Dependability

The deep sea diver, about to probe the ocean's depths in his work of reclamation, or discovery, finally glances at those who man the air pumps. Well might he ask: "Are they dependable?"

Dependability—*proved dependability*—is built into Darling Gate Valves. Oil drillers who have grown gray in service testify that which we already know to be true—"That Darlings combine all the dependable qualities a driller insists upon in a gate valve."

Darling Gate Valves are designed to insure year-in-and-year-out dependability, ease of operation and never failing ability to stay tight. While users will tell you they seldom need to touch a Darling Valve, it is worth while to know that they are most easily repaired in the field.

There's a dependable Darling Valve for every place and purpose—whether producing, conveying or refining. Diagrams of construction as well as catalogs will be gladly sent on request.

Emblem of
BUSINESS CHARACTER
Rice Leaders of the World Association
Represents High Standing in
NAME - PRODUCT - POLICY

DARLING VALVE & MFG. CO.

Williamsport, Pa.

New York Chicago Oklahoma City Houston

Mid-Continent Distributors:

Frick-Reid Supply Co. Atlas Supply Co.
International Supply Co. Petroleum Supply Co.

California Distributor:
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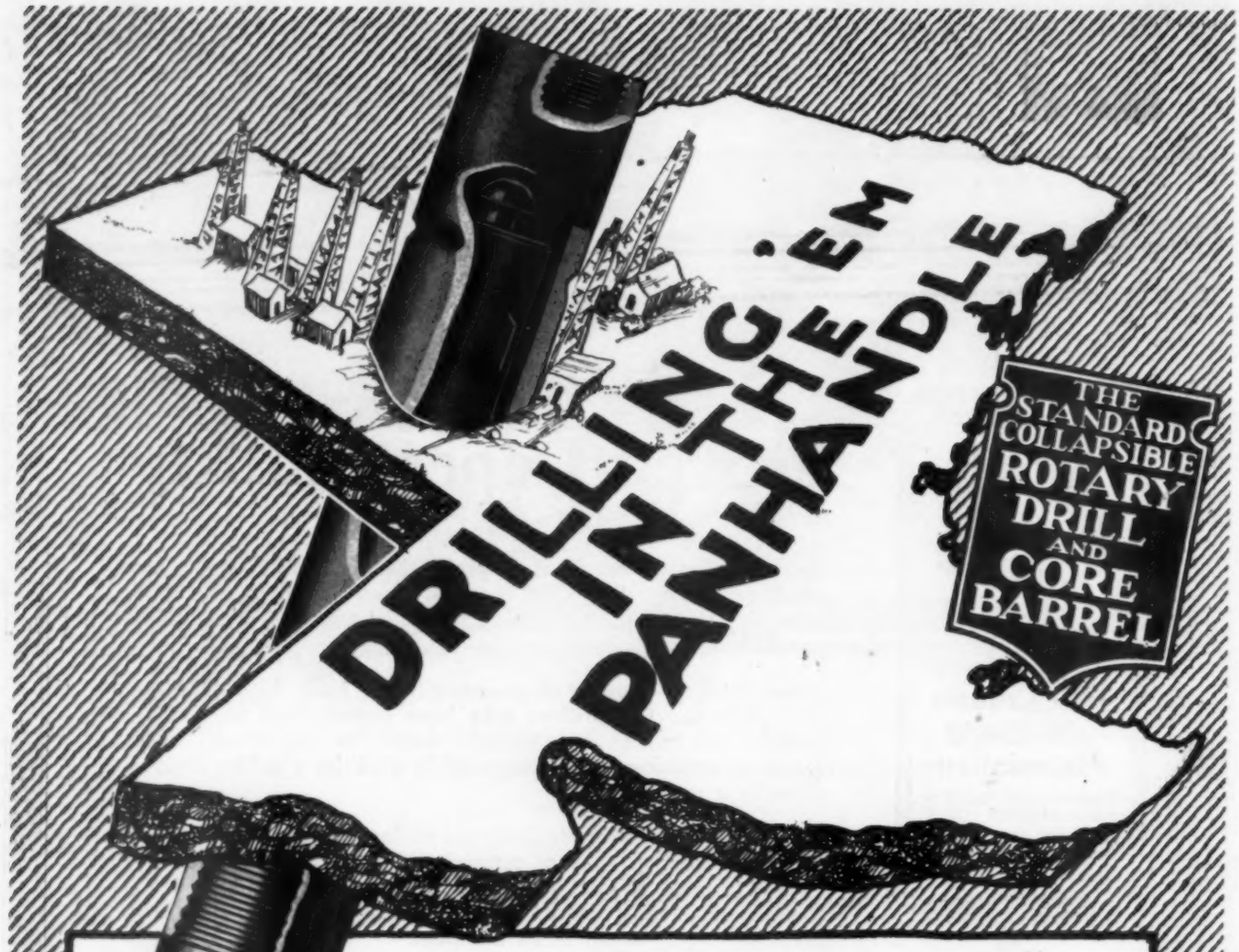
DARLING
GATE VALVES



—NEW RECORDS for SPEED have been set with this improved drill in the Panhandle "Red Bed" — 1050 feet in 9 DAYS — when the best previous time with the most costly dressed bits was 930 feet in 14 days.

—NEW RECORDS for ECONOMY resulted in the same test — for 81 pairs of Collapsible case-hardened cutters made the 1050 feet, at a cost of $2.25 per pair — while the companion well re-dressed ordinary bits 75 times to make 930 feet, at a cost of $7.50 per dressing.

The Standard Collapsible Rotary Drill aud Core Barrel actually SAVED $380.25 on "sharpening" alone—PLUS 5 DAYS of costly drilling time

Can You Afford to Continue Wasting Money with Obsolete Equipment?

WRITE TODAY FOR COMPLETE INFORMATION

O. M. CARTER

206-7-8 SCANLAN BLDG. HOUSTON TEXAS

W. T. HILTPOLD SALES AGENTS T. P. HEWITT

Say you saw it in The OIL WEEKLY

Why Go Crazy!

Why worry yourself into a sanitarium or asylum over lease problems? A broken down well, even though it be your best one, is nothing to cause uneasiness. Hitch an IRON KING pulling machine on and then stand back and smile at the ease and speed with which it places that well back among the producers. Lease troubles are many so why add to them by having a poor pulling unit?

Ready for the road

Balances easy

WATCH OUR SMOKE

A prominent operator of Pennsylvania writes that he has moved an IRON KING 400 feet, set it up and had the polish rod on the ground in 12 minutes. That's fast enough.

If your oil well supply store will not get you an IRON KING write us direct. Where shall we send you a catalog?

Iron King Manufacturing Co.
Bradner — Ohio

He's putting it up

All set

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DORECO

LOW PRESSURE GAS BURNER

TYPE H

THE NATIONAL SUPPLY COMPANIES

Say you saw it in The OIL WEEKLY

On the Job—Panhandle Field

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WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

Say you saw it in The OIL WEEKLY

Wilcox Sand May Give Seminole Area 150,000 Barrel Peak

Production reaches 61,249 barrels while district has 235 active tests under way

By GRADY TRIPLETT
Staff Representative

Tulsa, Oklahoma (By Wire)—The Barnsdall Oil Corporation added another Wilcox Sand well to the field early Wednesday when its Carter No. 2 well in NE SE NW of 24-9-6 came in making 3195 barrels at two feet in the sand at 4130 feet. Seminole City production Wednesday morning was better than 70,000 barrels a day.

Tulsa, Okla., (Late Bulletin.)—The Pure Oil Company's Strathers No. 3, located in the northeast corner of the southeast southwest quarter of Section 25-9-6, Seminole City, began flowing 280 barrels an hour October 19, after the Wilcox sand was topped at 4058 feet.

The new producer is a diagonal southwest offset to Bowlegs No. 3, completed last week by the Indian Territory Illuminating Oil Company, which is still making 9000 barrels daily.

The Strothers No. 3 proves up considerable acreage in the southwest part of Seminole City and points to big flush production from wells to drill in the vicinity of this location.

Tulsa, Okla.—Production from the Seminole area for Sunday, October 17, reached 61,249 barrels. Of this, the 13 Wilcox sand wells produced 50,160 barrels. In these figures are included what is known as Seminole City and the Searight pool, to the north. At present it is not believed the two districts will prove one field.

This high yield is set down not so much for its total as for comparison with estimates. It is now quite generally believed that Seminole output will pass 100,000 barrels daily and many are convinced that the daily output will climb to 150,000 barrels by January 1.

Previously Seminole production has been estimated as high as 100,000 barrels. Many placed the peak output much lower. In fact several men, after studying the field, ventured the guess that 60,000 would be the peak.

A Serious Factor

But seminole now looms as a serious factor in the Mid-Continent crude oil market for the winter. Already there is some trouble in moving oil, as pipe lines to the field are not complete.

In the way of development the important event of last week was the completion of No. 3 Bowlegs of the Indian Territory Illuminating Oil Company in the southwest corner of the northwest of the southeast quarter of section 26-9-6. It was completed October 16 for 6,500 barrels in the Wilcox sand, topped at 4043 feet. Two feet deeper the first oil showed. It was drilled to 4045 feet for the 65000 barrels initial. Then Saturday it was deepened a foot and responded with an increased flow of 9008 barrels Sunday, October 18.

This well is a quarter of a mile south of No. 1 Fixico of the Independent-Garland partnership, the first Wilcox sand well of the pool. This proving of the Bowlegs lease indicates that Wilcox production will run well to the south of the first well and gives the prospective area of the pool greater latitude.

The whole Seminole area now has 235 active wells. It is this that is responsible for estimates of 150,000 barrels as peak production from the pool. Another 60 days should see at least 75 wells reach the Wilcox level. Sufficient area has now been proven to insure that the bulk of these will produce oil from the Wilcox sand. So high estimates are in order.

Greatest Wilcox Pool.

Seminole seems certain to become the greatest Wilcox sand pool Oklahoma has known. So far this distinction has belonged to Tonkawa, where production from shallower sands was followed by another flood of oil from the Wilcox. At Tonkawa the Wilcox proved productive 200 feet down on the flanks of the structure. Seminole has not done this yet. But it is producing 70 feet down on the sides, with possibilities that further drilling will establish gusher output from wells still lower on the structure in the Wilcox.

Something of the nature of the Wilcox at Seminole can be gained from consulting the record of the discovery well. No. 1 Fixico in the southwest corner of the northeast quarter of section 26-9-6 was completed July 16 for 6380 barrels. At the end of three months, 92 days, it had produced 55,272 barrels, a daily average of 5870 barrels.

Output of this well went to 8,300 barrels at one time. wells ar enow producinrigl,tainnunun un un un ununun Recently the output has been dropping. Three other wells are now producing on the lease from the Wilcox. Their combined output is around 18,000 barrels.

Deepened Well Responds

Last week the Mid-Continent Petroleum Corp. deepened No. 1 Rentie in the southeast corner of section 14-9-6 from 4203 feet to 4209 feet and production climbed from around 2200 barrels to 4750 barrels. This is the north Wilcox well of the Seminole City pool, lying between the Independent-Garland wells and the Searight area, which has one producer.

Another Wilcox sand pool sharing the spotlight with Seminole is North Braman. The Comar Oil Company (Marland and Roxana) has five Wilcox sand wells there now and production is between 18,000 and 19,000 barrels.

The latest well is No. 6-W Harvell in the southwest corner of the northwest of the northeast quarter of section 21-29-1 west, Kay county, completed last week. Last Saturday it was drilled to 3371 feet and responded with 8202 barrels Sunday. No. 5 Priboth of the Comar Company, northeast corner of the northwest of section 21-29-1 west, was drilled five feet deeper to 3397 feet and its flow increased from 4400 barrels to 6557 barrels Sunday.

Most of the acreage at North Braman is held by the Comar Company, although The Texas, Gypsy, White Eagle and Mid-Continent concerns have acreage that may come within the zone of the Wilcox production.

Half the oil produced by the Comar is going to the Roxana through the Ozark Pipe Line Comapny, while Kay County Gas Company is running the other half to the Marland plant at Ponca City.

Loading Facilities Will Permit Large Shipments From Panhandle

Racks to have total capacity of 200,000 barrels daily; low rates to all refining centers

By H. H. KING
Staff Representative

Amarillo, Texas.—Tank car racks are being constructed on the main line of the Panhandle & Santa Fe Rairoad between Amarillo and Pampa and on the Isom branch of this railroad in sufficient numbers to permit daily shipments of crude from the Panhandle district to reach the 200,000 barrel mark. However, the officials of the Santa Fe are estimating the daily crude shipments to average 100,000 barrels during the peak period.

The Panhandle district is expected to rival the Smackover field on making heavy shipments of crude in tank cars, as racks are being installed to provide accomodations for approximately 900 cars at one time. A small percentage of this loading rack space is to be utilized in shipping natural gasoline from Carson, Hutchinson, Gray and Wheeler Counties.

About 25 producers and purchasers of Panhandle oil will engage in shipping crude over private racks to the various refining centers between the Gulf Coast and the Great Lakes, while one concern will ship crude to Canada. This tank car movement of crude promises to place Panhandle oil in greater competition with Mid-Continent oil than if major pipe line systems were used to transport the oil to market for the reason that many independent refiners in the Mid-Continent are shifting to cheap Panhandle crude through the use of tank cars, while if all the production was marketed via pipe lines only a few refining plants in the interior would have access to the crude.

The accompanying tables showing the owners of the car racks completed and under construction, capacity of racks, and location of same, affords some idea as to the amount of oil that will be moved. The oil is available in the Texas Panhandle district to supply each of these racks with crude over a long period, with a current daily output of 152,210 barrels and the peak not expected until cold weather forces a general shut down on field work.

Competitive Freight Rate

The Interstate Commerce Commission and the Texas Railroad Commission have authorized freight rates on crude moving out of the Texas Panhandle district in tank cars to interior refining centers and to tidewater points that permits the refiners to obtain a greater profit on Panhandle crude than the same gravity of Mid-Continent oil. The Panhandle crude is available at $1.25 per barrel, irrespective of the gravity, at the well, and the gravity averages 37 degrees.

An example of the freight rates applying from the Panhandle district to Mid-Continent refining centers is illustrated by the fact that Ponca City, Wynnewood, Augusta, Arkansas City (Kansas) and other leading refining centers in Oklahoma and Kansas are getting a rate of 13 cents per 100 pounds, while Fort Worth, and Wichita Falls refiners get a 15 cent rate. The rate to Dallas is 17 cents, and to Gainesville, Texas, is 15½ cents. Houston, Galveston, Beaumont will receive a 20 cent rate effective October 25, while on this date Atreco, Magpetco, Sun, Nederland, Port Neches, Smiths Bluff, Sabine, Sabine Pass, Port Arthur, West Port Arthur and Baytown, all of which are tidewater terminals, will have a rate of 21½ cents per 100 pounds on all Panhandle crude originating on the Santa Fe system. These rates permit a heavy movement of crude from the Panhandle for coastwise and export delivery, and expire December 31, 1926, unless sooner canceled, changed or extended, according to a circular No. 7043, recently issued by the Texas Railroad Commission.

New Line Opened

The Santa Fe Railroad is in position to command most of the crude movement from the Texas Panhandle, and is upholding its excellent reputation for service to oil companies in the face of a congested freight situation on its main line between Amarillo and Pampa. The 30-mile extension built by the Santa Fe to the heart of the flush oil area in Hutchinson County to a station known as Isom was officially opened October 1, but owing to heavy rains an embargo on both inbound and outbound freight was posted prior to this date on Isom-Panhandle freight. The embargo was lifted Saturday, October 16, and oil companies are now permitted to bill their field supplies to Isom, while tank car shipments of crude from Isom are being started by the

(Continued on page 32.)

Panhandle Loading Rack Capacities

The list of tank car racks in operation and under construction on the main line of the Panhandle & Santa Fe Railroad between Amarillo and Pampa is:

Owner and Address—	Rack Location	Car Capacity Operating	Car Capacity Building
Amarillo Refining Co., Amarillo, Texas	Amarillo	24	...
Pantex Pipe Line Co., Amarillo, Texas	Amarillo	39	...
Gulf Production Co., Houston, Texas	Panhandle	40	...
Marland Pipe Line Co., Ponca City, Okla.	Panhandle	50	...
Phillips Petroleum Co., Bartlesville, Okla.	Panhandle	6*	...
Plains Pipe Line Co., Wichita Falls, Texas	Panhandle	28	...
Atlantic Oil roduction Co., Dallas, Texas	Pampa	25	...
Empire Gas & Fuel Co., Bartlesville, Okla.	Pampa	..	50
Humble Pipe Line Co., Houston, Texas	Pampa	24	...
Sinclair Crude Oil Purch. Co., Tulsa, Okla.	Pampa	40	...
Toronto Pipe Line Co., Wichita Falls, Texas	Pampa	..	50
Wilcox Oil & Gas Co., Tulsa, Okla.	Pampa	..	10*
Prairie Oil & Gas Co., Independence, Kansas	Kingsmill	30	...
Roxana Petroleum Corp., St. Louis, Mo.	Kingsmill	..	10
The Texas Company, Houston, Texas	Kingsmill	..	20
Totals		306	140

*Casinghead gasoline car racks.

The list of tank car racks proposed and building on the Isom branch of the Panhandle & Santa Fe Railroad between Panhandle and Isom follows:

Owner and Address—	Rack Cap. in cars	Car Rack Location	Mile Post from Panhandle
Amarillo Prod. & Ref. Corp., Amarillo, Texas	15	Sec. 19, Block "Y"	28.1 Miles
Alamo Refining Co., Amarillo, Texas	10	Sec. 1, Blk. B-4	31.0 "
American Ref. Co., Wichita Falls, Texas	30	...	...
Bell Oil & Gas Co., Tulsa, Okla.	15	Sec. 18, Block "Y"	27.0 "
Derby Oil Co., Wichita, Kansas	6	Sec. 20, Block "Y"	28.7 "
Empire Gas & Fuel Co., Bartlesville, Okla.	20	Sec. 19, Block "Y"	28.2 "
Gasoline Chemical Corp., Denver, Colorado	20	Sec. 19, Block "Y"	27.9 "
Humble Oil & Ref. Co., Houston, Texas	20	Sec. 75, I&GN Blk. 5	18.3 "
Marland Refining Co., Ponca City, Okla.	60	Sec. 18, Block "Y"	26.7 "
Megargel Oil & Ref. Co., Wichita Falls, Texas	25	...	...
Middleton Oil & Ref. Co., Corsicana, Texas	20	Sec. 18, Block "Y"	26.8 "
Mid-West Exploration Co., Denver, Colorado	15	Sec. 13, Block "Y"	29:4 "
Pantex Pipe Line Co., Amarillo, Texas	25	Sec. 18, Block "Y"	26.5 "
Phillips Pet. Co., Bartlesville, Okla.	60	Sec. 13, Block "Y"	30.0 "
Prairie Oil & Gas Co., Independence, Kansas	50	Sec. 23, Block "Y"	26.6 "
Roxana Pet. Corp., St. Louis, Mo.	15	Sec. 13, Block "Y"	29.6 "
Skelly Oil Company, Tulsa, Okla.	25	Sec. 1, Blk. B-4	31.0 "
White Eagle Oil & Ref. Co., Kansas City, Kan.	25	Sec. 4, Blk. B-4	30.6 "
Totals	456		

The list of tank car racks in operation on the main line of the Chicago, Rock Island & Gulf Railway in Wheeler County follows:

Owner and Address—	Location Rack	Operating Car Capacity
Humble Oil & Refining Co., Houston, Texas	Lela	7
Mid-West Exploration Co., Denver, Colorado	Lela	5
Totals		12

Crude Price Cut Still a Rumor, Despite Unfavorable Conditions

Rail facilities placing more Panhandle crude in direct competition with rest of Mid-Continent

By KENT RIDLEY
Staff Representative

DESPITE another increase of approximately 30,000 barrels daily in production and unfavorably refined market for all except fuel oil, there is no more evidence of weakness in the crude oil market than has been for a number of weeks past. There are current rumors of pending cuts, but these rumors have been the order for a long peiod duing which the poduction total has been mounting so that each week marks a new high for the year.

Producers in the Panhandle of Texas are showing some disposition to hold back the flow from their wells to maintain the established price of $1.25 per barrel being paid in that section. But the area gained more than 12,000 barrels daily during the last accounting period—this gain, of course, putting the fields to a new high. Added to this over production in Texas, comes forecasts that the total yield of Seminole City will reach 150,000 barrels daily.

Isolation of the Panhandle from transportation which has served to curtail the influence of this oil upon the general market situation, is being removed by rail facilities being provided to handle a maximum of 200,000 barrels daily, and it is said that the movement will approximate 100,000 barrels daily shortly.

Export Gasoline Cut

Monday the Standard Oil Company of New Jersey posted another half-cent cut in the price of export gasoline, applying to contracts with Mid-Continent refiners. This is the third reduction on these contracts since late September, and puts the high gravity export grade lower than domestic New Navy. This cut has naturally had a disturbing influence on refinery prices generally, and many refiners have broken their contracts with the New Jersey company.

In contrast to the action of the Standard in reducing the price, Sinclair Refining Company entered the North Texas market Monday with orders for 1,000,000 gallons of export gasoline for delivery over November and paid 10¼ cents per gallon at the refinery. This price is more than half a cent higher than that now being paid on the Standard's contracts.

Seminole City Threat

Predictions have been so numerous that the price schedule of Mid-Continent crude oil will be lowered that its repetition is of little value.

In Oklahoma the chief field contribution to a crude cut threat is the growing output of Seminole City from the Wilcox sand. Daily output passed 60 000 barrels October 16. Previous to this many had predicted that figure as peak for the field. But it was reached with only 13 Wilcox sand wells producing, these contributing 50,000 barrels to the total, leaving the remainder to come from 22 Hunton lime and sand wells at shallower depths.

The Seminole area, which includes the Searight pool, now has 235 active wells. Sufficient area has been found productive in the Wilcox sand to insure an output of at least 100,000 barrels daily at the peak. There are many reasons to believe this pool, or pools, as further drilling may determine, will reach 150,000 barrels daily by January 1.

With more Panhandle crude coming to Mid-Continent refineries each day and Seminole giving up greater amounts of high grade oil, the Mid-Continent crude oil market is certainly weak.

A refiner remarked last week that he already has anticipated a cut in the price of crude. He pointed out that U. S. Motor gasoline was selling that day at 9¾ cents a gollon. That, he said, was evidence that refiners expected crude at lower prices and already had prepared for it.

The gasoline market is weak in all quarters. It looks like a 10-cent market over the early winter. A gasoline market of this class will not support the present schedule on crude oil.

Other than these general conditions there is little evidenec of a cut in crude oil prices. There is some congestion at Seminole but this is only temporary. Sufficient pipe lines are either under construction or contemplated to care for output there.

West Texas Buyer

Crude buying activities of Standard of Indiana have been shifted to the Crane-Upton County district in West Texas, where a tank farm, crude gathering system and a large tank car rack will be installed by the Southern Pipe Line Company, a subsidiary, to take upwards of 50,000 barrels daily, if available. Crude connections are being solicited in the Crane-Upton County district by the Southern Pipe Line Company, and a contract has been made with the Independent Oil & Gas Company for a single order of 200,000 barrel when produced at a minimum price of $1.00 per barrel at the well, or the average price posted in the field, if the latter is higher. This district is now producing daily about 14,000 barrels of crude testing from 26 to 32 gravity, and purchases by Marland and Humble, who are the only buyers in the district, have been somewhat limited, owing to the difficulty experienced in disposng of the oil when transported to tidewater with so much Panhandle crude available at a slightly higher price.

The Southern Pipe Line Company will deliver its purchased crude to Destrehan, La., where the Mexican Petroleum Corporation, also a Standard of Indiana subsidiary, is operating a skimming plant that is adapted to heavy oils. Roxana Petroleum Corporation is likewise preparing to make shipments from the Crane-Upton County district in tank cars to the New Orleans Refining Company at Norco, near New Orleans. The West Texas crude will replace the declining supply of Smackover crude, which has been the principal material used by the plants at Destrehan and Norco, besides Mexican crude. The tank car shipments to be made by Southern and Roxana from West Texas will permit increased field work in the Crane-Upton area, as a limited market for the oil lately has held back production.

The Texas Panhandle district came through with another substantial gain in daily prdouction during the past week, having averaged 152,210 barrels daily from 538 active producers, thereby gaining 12,475 barrels. The gain was principally in Hutchinson County, with Gray County ascending to a new daily average of 7,125 barrels. New production records for the district are expected to occur in rapid order for the next 60 days, as the Santa Fe Raiload has begun operating its spur line, extending from Panhandle to the heart of the flush oil area in Hutchinson County, a distance of 30 miles, with work underway on a double track. Eighteen tank car racks, having a capacity of 456 cars at one time, are completed, or building on this spur line, while the racks completed and building on the main line of the Santa Fe between Amarillo and Pampa will permit 446 cars to be loaded at one

time, making a total of 901 car capacity.

Panhandle Price Firm

Continued production gains in the Texas Panhandle is not weakening the crude market in the district, and prices are firm at $1.25 per barrel, which is the general price posted by the major buyers in the flush areas. Producers are holding back their production when the market price is not available by pinching the flow, or stopping the drilling tests on top of the pay. Numerous independent buyers, preparing to make tank car shipments from the district to refining centers in the interior and on the Coast, are canvassing the district for crude at distress prices, but without success. Crude market condtions in the Panhandle forestall any further price cuts until other Mid-Continent areas are given drastic price reductions.

The adverse turn of events in the export situation has been especially hard on the North Texas refining plants, who cater to the wants of the exporters more so than other Mid-Continent refining centers. The series of price cuts posted by Standard of New Jersey on its contract price covering 64-66 gravity gasoline within the past few months has resulted in all but two North Texas refineris cancelling their gasoline contract with the above exporter. Standard's contract price on this commodity now amounts to 9.65 cents per gallon f. o. b. North Texas plants. Heavy stocks of this high grade motor fuel now held by Standard of New Jersey on the Gulf and Atlantic Coasts is abnormal for this season of the year, and efforts are being made to liquidate same regardless of the drop in prices.

General curtailment of crude charges to stills in the North Texas district has followed the slow domestic demand for U. S. motor gasoline, which was quoted at 9⅛ to 9¼ cents per gallon early this week and idleness of the export trade. This move has reflected fresh strength in the fuel oil market, owing to limited production, and prices were firm early this week at $1.47½ and $1.50 per barrel. Kerosene continues to lose ground on prices and the demand is only fair at the weaker prices.

Drill More Wells

Denver, Colo.—The Texas Production Company is so well pleased with the performance of its well on the Tow Creek dome, it will drill several more. The company completed some shale wells on the structure, which have performed more consistently and economically than the average sand wells in other producing fields. The company believes that a pool exists somewhere on the structure.

Panhandle Operators Told Reasons Behind Price Cut

Amarillo, Texas. — Speaking before the West Texas Oil and Gas Association here last week, W. S. Farish, president of the Humble Oil and Refining Company, outlined to producers of the Panhandle district, major factors in the market situation, pointing out reasons for the present price of Panhandle crude. In taking this step Mr. Farish established a precedent, for seldom if ever before has the head of such a large organization as the Humble company felt it necessary to explain reasons for company policy. Humble's recent cut in Panhandle crude has brought protests from operators to state and federal authorities.

Mr. Farish's remarks follow:

The production today in the Panhandle is approximately 142,000 barrels daily. The movement of oil out of this field has averaged over the recent past about 72,000 barrels daily. For the next six months at least the outlet will be confined to rail movement, and such movement can probably not exceed 100,000 barrels per day.

All estimates as to production in the Panhandle indicate a constantly increasing volume up to 200,000 barrels daily or more, so that over the next six months, for every barrel of this crude produced and shipped one barrel will have to be stored in this area. The only alternative against storing this large volume of crude is less production.

If the work is slowed up and wells are not finished at the same rate of completions as during the past 60 days, there is a reasonable prospect that the figures of 200,000 barrels will not be reached, and to the extent that such slowing up of completions results there will be just that much less oil for which storage will have to be provided.

The cost of steel storage, which is the only safe storage for oil of this gravity, with land and tank connections is approximately 50 cents a barrel.

It is reasonable to assume that any oil that is now put into tankage in the Panhandle will remain in tankage at least two years or more, so that any purchaser of oil to go into storage must necessarily figure the probable cost of this oil to him at the time it can be moved out of storage. Such cost will include in addition to the price now paid for the oil and tankage, interest on this investment, insurance, taxes, etc., which can not be figured at less than 20 cents per barrel per year. Certainly oil for which there is no market today and which must therefore go into storage has not the same value as oil that can move and be marketed currently.

Sulphur Content

Panhandle crude of high sulphur content is worth less to the refiner than crude of similar gravity free of this objectionable sulphur. Refiners will disagree as to the amount of this differential, but based on present value of products it is estimated to be approximately 35 cents per barrel.

In addition to the sulphur content affecting its value, Panhandle crude must stand today the relatively higher rail cost of transportation. There is also another important factor which can not be overlooked, and that is that a market for this particular quality of crude must be created and that this market can only be created on a price basis which will induce refiners to run crude of high sulphur content in place of the crude they are now running.

This is particularly true today in a period of more than ample crude supply.

These three factors are the ones which will determine the differential at which Panhnadle crude will move in competition with crude from the older fields.

"Today's Value"

No one can forsee at this time what may be the value of this stored crude two or three years hence, when sufficient transportation facilities for its movement have been established and when an adequate market for this high sulphur crude has been created.

It is the view of our company that a price of $1.25 a barrel for Panhandle crude to go into storage is the maximum which we are today justified in paying under existing conditions.

Panhandle crude prices naturally will be influenced by the quantity produced and the price of other crude oil.

Marland Opens Production Office at Houston

Houston, Texas—Preparations are being made by the Marland Oil Company of Texas to establish a branch production office at Houston within the coming week. This move follows the opening of the company's first production in the Gulf Coast, on its 50-acre Prudent Investment Company lease at Pierce Junction.

The Houston production branch will be located in the Post-Dispatch Building with the geological and geophysical departments already in Houston. The company production work in the Gulf Coast will be in charge of F. J. McNellie, production superintendent of the Marland Oil Company of Texas. He has formerly been located in the Fort Worth office of the company.

EDITORIAL COMMENT

IT is rather unusual that the president of a large oil purchasing company should journey from one end to the other of so large an area as Texas to discuss with the producers of oil the question of the price that is being paid them. It may be that we are entering upon a new era in this industry, in which there will be a better understanding which will work to the advantage of all parties concerned. Heretofore when the buyers have found it necessary to discipline the producers into reducing their output, the lower prices and proration regulations incident thereto have been put into effect without comment.

And when W. S. Farish, President of the Humble Oil & Refining Company goes to Amarillo to discuss with the West Texas Oil and Gas Association and the officials and politicians who have been interested in the troubles of the over-producing Panhandle section, it is to be borne in mind that this gentleman is also the president of the American Petroleum Institute. In the latter capacity his advice to the producers on the situation they are facing was founded not upon the possibly selfish view of his company, but upon an interest in the general welfare of the industry. In addition to that, Mr. Farish had recently conferred with Mr. Teagle, head of the New Jersey Company, of which the Humble is subsidiary, and it is to be presumed that his statements at least had the full sympathy of the larger company with its various ramifications.

The logic of what was told the Panhandle producers is sound. It is, of course, not pleasant from the standpoint of the producer, the land owners or chambers of commerce who have enlisted the politicians and governmental departments in an investigation of the reasons for the low price of oil in that section. But it has been made plain to them that the reasons for the troubles the producers find themselves in are entirely on the producers. If too much oil was not being produced the prices would not be lowered.

Details on costs of handling the flush of production in the Panhandle are illuminating. It may be expected, however, that there are many who will question the figures given. But a few minutes with a pencil on the back of an envelope will prove that they are conservative.

OBVIOUSLY what the industry needs most is a means of protecting itself from the market breaks that follow naturally behind the uncovering of new flush fields. It is palpably unfair to the producers in the older fields where the costs of producing oil from settled wells should normally fix the market value of crude, to have their reasonable profits wiped out because of the flush production of newly opened areas.

It might be argued that each old field was once a flush proposition and that the then pioneers reaped their harvest through being favored by nature in getting out a large volume of oil at low costs. But such is not always the case.

The buyers of crude are interested in stability of the industry, and they are interested in the continued operation of the thousands of small wells whose cost of operation is such that there is a tendency toward abandonment of them when the flush fields force the whole price structure below the reasonable profit normally made by these small producers.

The problem, then, is to devise some arrangement under which the flush oil, produced at lower prices, can be absorbed into the industry without ruination to the small producers which are the very backbone of the industry. At the same time it is desirable that operators in the areas which produce the over abundance of oil should be discouraged in their mad scramble for mounting output.

Upon the purchasers falls the burden of collecting and storing the surplus oil. As production mounts in each flush area, there is a limit to the amount that can be economically absorbed, and it would be equitable to pay producers full price for this amount and penalize them for the accumulation of stocks for which tanks must be provided, and financing the storage in such tanks. Such a scheme might be hard to work out, but it has practically been done in periods when the pipe lines paid for part of the production and stored the balance for account of the producer. Probably it would be found possible to pay producers in the flush fields for a portion of their oil in the basis of its value on the current market into which it might be absorbed, and a lower price for the portion that must go into storage. The lower price would take into account the cost of the tankage to be erected for it, and the cost of carriage for such period as it might be anticipated it would remain in storage. The latter element, of course, is a matter of speculation, with no certainty that the buyer would profit in the end.

ASIDE from being what was probably the most constructive meeting ever held within the industry, excepting only the group meetings of committees engaged in standardization work, the mid-year gathering of the Petroleum Division of the A. I. M. M. E. at Tulsa brought out one of the year's outstanding contributions to the science of the industry.

The paper presented by Messrs. Beecher and Parkhurst dealing with the effects of dissolved gas upon the viscosity and surface tension of crude was greeted by engineers as a most commendable piece of research.

In sending his congratulation by wire, T. E. Swigart, production superintendent for the Shell Company of California, said: "It has more real information in it than most any technical paper on production methods that has been issued in recent years."

Crane-Upton Area Has New Crude Buyer In Southern Pipe Line

Standard subsidiary will buy 50,000 barrels daily

San Angelo, Texas—The Southern Pipe Line Company, a crude purchasing and transporting subsidiary of the Dixie Oil Company, which is in turn controlled by the Standard Oil Company of Indiana, has joined the ranks of the crude buyers in the Hurdle district, centering on the Crane-Upton County line, and has announced that its daily purchases will go to 50,000 barrels daily, if the oil is made available.

The entrance of the Southern Pipe Line Company into the Hurdle district, which is producing about 14,000 barrels of oil ranging from 26 to 32 gravity daliy, revives competition among the buyers. Humble and the Kay County Gas Company have been the only purchaser, and their daily crude runs from outside leases for purchase have been curtailed lately, owing to the difficulty in marketing this low gravity crude with so much Panhandle oil offered at only a slightly higher price. Humble and the Kay County Gas company's current posted prices range from 80 cents for less than 26 gravity crude to $1.35 for 36 gravity and above, while the average crude tests 29.5 gravity, thereby netting the producers $1.00 per barrel.

200,000 Barrel Contract

The Southern Pipe Line Company has contracted to purchase 200,00 barrels of crude from the Independent Oil & Gas Company, which is one of the leading independent producers in the Hurdle district, paying a minimum price of $1.00 per barrel at the well, or the average posted price in the district, if the latter amounts to more than $1.00 per barrel. In connection with this contract, which is subject to renewal from time ot time, two 55,-000 barrel steel tanks being constructed by the Indepndent in the south half of the southwest quarter of section 64, H. & T. C. survey, block 35, near McCamey, have been purchased by the Southern Pipe Line Company, and will be available for oil in a few weeks. Other tanks will be added to afford adequate field storage, while in the meantime the National Supply Company has been given a turnkey contract to construct a complete crude gathering system for the Southern Pipe Line Company, with a large tank car rack on the Orient Railroad at Crossett, located one mile south of the tank farm.

Besides the Independent's production, the Southern Pipe Line Company will serve the Dixie Oil Company and Amerada Petroleum Corporation, while crude solicitors are at work in obtaining additional connections in the district. The crude will be shipped to the Mexican Petroleum Corporation's 25,000 barrel skimming and asphalt plant at Destrehan, La. The latter concern is controlled by the Standard Oil Company of Indiana, through the purchase of the Pan-American properties some time ago and has been in need of crude, due to the falling off of the heavy production at Smackover.

The Roxana Petroleum Corporation is also arranging to move its production in the Hurdle district to a Louisiana refining point, and has let contract for the constructon of gravity lines connecting its Della Bowen, Ed. Hughes and B. H. Estep leases, Upton County, to a pump station near McCamey, where a 10-car capacity car rack will be built on the Orient railroad. E. G. Allen, who has charge of Roxana's production in the Hurdle district, will also assume charge of the crude gathering and loading system. Roxana's oil will be delivered to the New Orleans Refining Company, Inc., at Norco, near New Orleans, where a 20,000 barrel skimming and asphalt plant is operating on Mexican and Smackover crudes.

Dixie, in Caddo Area, With Three Flowing Wells, Newest North Louisiana Field

Shreveport, La.—With three flowing oil wells, one more than six weeks old and another flowing 2,700 barrels per day, the Dixie field, in township 20-15 of Caddo Parish, takes rank as the newest oil field in the Louisiana-Arkansa territory. It will be remembered that the discovery well was brought in by Victor Wenzel and associates on September 3, last, at a depth of around 2200 feet. This well is still flowing at the rate of 250 barrels of fluid per day, of which about 15 per cent. is salt water. The second producing well in the new field was finished last week by The Texas Company on its Curtis lease, in section 14-20-15, at a depth of exactly 2,200 feet. It is making 2,700 barrels per day, by actual gauge, through a ¾-inch opening. The third well was brought in last Saturday by the Magnolia Petroleum Company with an initial flow of 600 barrels per day from a total depth of 2209 feet. It is on the Wemple land, in section 14, about 500 feet north of The Texas Company's well. The new field is located in the southeastern portion of the famous old Caddo district, and is about mid-way between Oil City, on the west, and the towns of Dixie and Belcher, on the east.

Watching Arkansas Test

The nerves of Arkansas oil operators are growing taut as the time for the completion of the Marine Oil Company's well on the Urbana-Lawson structure approcahes. Eight-inch casing has been cemented at a depth of 2,524 feet, and a test may be made during the latter part of the week. Operations were discontinued in three of the Urbana-Lawson tests during the last week, although work was begun on four new wells located in the same area. Thorpe and others have quit in a water sand at 2090 feet in their Peck well, in section 22-18-13; and the Natural Gas & Fuel Corporation's Cordell well has been shut down at a total depth of 3093 feet. The Simms Oil Company quit drilling at 3115 feet in its Simmons well, in which a gas blow-out occurred several weeks ago; and preparations are now being made to plug back to the gas-bearing stratum in an effort to bring it in again as a gas well. Allison and others are building a derrick on the Howard farm in section 8; the Superior Oil Company has surveyed off a location on the Cordell land in section 5, and the Southern Crude Oil Purchasing Company has started drilling on the Hill property in section 5, all in township 18-13. Wingfield and others are rigging up to drill their Morrison No. 1, which is located in section 5-19-13.

The Ohio Oil Company is rigging up to drill a wildcat test on land owned by the Caddo Levee Board in section 28-23-16, near Rhodessa, in Caddc Parish. This location is about one mile north of wells drilled a couple of years ago by Bill Rowe, the Latex Oil Company, and others, in which considerable quantities of oil were found

E. A. Underwood and others are rigging up to drill a wildcat well on the Bullock land, in section 2-20-7, Claiborne Parish, about two miles south of the town of Homer and about five miles southeast of the nearest production in the Homer field. The Arkansas Fuel Oil Company has built a derrick on property owned by Mrs. H. H. Blue in section 9-12-6e, of Franklin Parish.

Pure Oil Company Gets Oil and Heavy Gas in South Louisiana Test

Sweet Lake, in Southern Calcasieu Parish, producing from record depth of Gulf Coast

By WALLACE DAVIS
Staff Representative

Houston, Texas—The Pure Oil Company has opened a new productive area at Sweet Lake, located 19¾ miles south and slightly east of Lake Charles, Louisiana, in Cameron Parish. The Sweet Lake No. 3 wildcat, the discovery well, came in October 11, with an initial production of 375 barrels of oil and 60,000,000 cubic feet of gas from eight feet of rich sand, the bottom of which is 5897 feet. Due to the terrific gas pressure, liability of a cratered hole was seen and operators pinched the well in with a 3/16-inch choke, cutting production down to 113 barrels of oil and 15,000,000 feet of gas.

The oil at Sweet Lake tested 30 Baume gravity at 66 degrees. It was pipe line crude with no show of impurities.

The well is located slightly east of Sweet Lake, a body of fresh water 2½ miles long, 1¾ miles wide and about nine feet feet in maximum depth. The well is almost exactly in the center of an 8000-acre block held by the Pure. So well is the prospective productive acreage blocked by the company that competition is considered fairly out of the question, making the new field another instance of single company operation, which is becoming more common in the Gulf Coast territory all along.

Aside from opening a new field, the Sweet Lake No. 3 well hangs up two new records in this part of the United States. It is the deepest producing well in the Gulf Coast by 421 feet, going this distance lower than the Vacuum Oil Company's Freiberg & Woolf No. 1, a 5476-foot producer at Lockport, Louisiana. The second record made by the new well is that in it was set 5864 feet of 6⅝-inch casing, by 10 feet the longest single string set in this territory, going that much lower than the string set recently by the Vacuum in its Lock Moore No. 4 well at Lockport, the record depth for the Gulf Coast, drilling Monday, 6150 feet.

Production is temporarily being run to a small storage tank near the Pure's camp on the lake shore, about 1¾ miles from the well. According to present plans, the crude will be handled by barge through a canal running from Sweet Lake to Grand Lake, and then into the Gulf. Facilities for handling the production by tank car are not conveniently available, the nearest railroad being the Southern Pacific line at Lake Charles, the nearest town of appreciable size to the field.

The Sweet Lake No. 2, the only other active test at Sweet Lake at present, is setting whipstock to sidetrack at 4500 feet, after sticking a drill stem at 5226 feet, where a show of oil was encountered. No new locations were made at the end of the past week.

The discovery well is located 1000 feet west of the No. 1 Sweet Lake, the first well drilled there by the Pure, and which blew out at 4502 feet and cratered the hole, losing practically all of the drilling equipment. The blowout left a cone shaped hole about 40 feet deep, which bubbled gas for several weeks and then sanded up.

The outstanding characteristic about the Sweet Lake field is the strong gas pressure. First drilling in the vicinity was done from indications of gas bubbling up in the middle of the lake. The Gulf Refining of Louisiana drilled a test well to 3232 feet without a show seven years ago and abandoned the hole. Not long afterward Emerson and Noble of Lake Charles drilled a test to 3062 feet with little encouragement. The Pure blocked its present holdings in 1924 with the purpose of testing out the vicinity of the seepage to lower horizons than had formerly been reached.

Pure Oil Company's Sweetlake No. 3, which opens a new field in Coastal Louisiana, flowing from 5897 feet, the deepest oil producer east of California.

The outstanding point of interest at Sweet Lake is the question of the source of its crude. Geologists have never been able to determine whether it is a salt dome or an anti cline structure proposition. No salt or cap rock has yet been encountered in drilling there. In this way Sweet Lake resembles Lockport, Goose Creek and the Orange field, where no salt dome has ever been outlined. A factor in common with these four fields is their relative nearness to the Gulf of Mexico, each having been covered by gulf waters since the locations of the many salt dome pools in this territory were a part of the gulf floor. Another common characteristic of these four pools is their depth, all four producing from lower horizons than the salt dome pools generally.

Casing in the Sweet Lake No. 3 was floated into the hole to relieve the strain on the derrick and draw works. This method of running casing is uncommon in the Gulf Coast territory, because, although it is an easy method of setting casing, it involves dangers such as collapsing the casing and also getting a casing seat not as good as that obtained when the string is lowered by the regular method.

The successful completion of the Sweet Lake discovery well

represents an unusually good drilling job, well carried out in the face of extraordinary difficulties, and much credit has been given Homer MacDuff, field foreman, and Pure Oil Company engineers. In the first place the derrick foundation was set in nine feet of water, which, in times of high winds resembled much a high sea, waves coming over the derrick floor were not uncommon. In setting the derrick a raft of 12x12 foot timbers was floated over the location and then made fast with piles driven into the lake bottom. The crew, maintaining living quarters at the Pure's camp near the lake shore, went to and from work in a gasoline launch, while equipment was carried to the location by barge. More than a year was spent in drilling the well.

The Sweet Lake vicinity practically duplicates Lockport field from the standpoint of topography, being an unending stretch of swamps with almost a continuous mass of water during the rainy seasons, which prevail most of the year. The depth of the lake varies according to the amount of water consumed for irrigating rice farms in the surrounding country.

Members of the crew working at Sweet Lake say life there is just "one alligator after another." Precaution had to be taken at all times by workmen when on the lake shore, due to the great number of alligators inhabitin' the marshes.

Rio Bravo Field Foremen Revel Over Success

Houston, Texas. — Rio Bravo Oil Company field foremen celebrated the production of the millionth barrel from two acres in 90 days on the T. & N. O. right-of-way lease at Spindletop when they gathered in Houston for the quarterly conference last week. Representatives from Electra, Wortham, Luling, Saratoga, Pierce Junction and Spindletop were present at the conference.

The field foremen were guests of the company at a banquet at the Warwick Hotel October 14. Following this a house warming was held at the Home of John R. Suman, vice president and general manager of the company.

While the field foremen from the various sections of Texas were in the Gulf Coast they were taken on an inspection trip through Spindle Top field.

Rio Bravo's field foremen conference is a quarterly affair, at which opinions are exchanged, new ideas and equipment discussed, and reports made on the work in each field where the company at a banquet at the Warwick progress has been seen as a result of the conferences, according to Rio Bravo officials.

Loading Facilities Will Permit Large Shipments from Panhandle

(*Continued from page 26*)

companies that built their racks before the completion of the spur line.

The same freight rates now applying on crude moving in tank cars from racks along the Santa Fe main line between Amarillo and Pampa, a distance of about 54 miles, will apply on the Isom spur line, which extends approximately 30 miles north of Panhandle. An effort has been made by an official of an independent pipe line company engaged in transporting crude from the Carson-Hutchinson County oil area to tank car racks at Panhandle to have the Santa Fe place a differential rate on crude oil moving from points on the Isom spur line out of Panhandle of about 2½ cents per hundred pounds. Such a move would penalize the shippers over the 18 separate racks building and proposed for the Isom area to satisfy the applicant for the differential.

The Santa Fe will make the inbound freight rates on heavy supplies (oil field equipment, building materials, etc) about 50 cents per ton higher on deliveries to Isom and intermediate points than to Panhandle, and apply the Panhandle, or Panhandle group rate on oil, crude or refined, outbound, either to the south through Amarillo or to the north through Kiowa. According to F. B. Houghton, freight traffic manager, the crude hauls are measureably long, and it is hoped that the Isom spur line will prove to be a real feeder.

Room for 902 Cars

The number of tank car racks completed and under construction on the Isom spur line of the Santa Fe will have a parking capacity of 456 cars, while those completed and building on the main line between Amarillo and Pampa will permit the loading of 446 cars at one time, making a total of 902 cars capacity. These racks are distributed over a total distance of 84 miles, thereby permitting faster movement of empties and loaded cars. The Isom spur line is being double tracked, as the Santa Fe is expecting the heaviest loadings to take place on this section of its system. Long pipe line hauls are necessary to deliver crude to the racks on the main line.

A special fleet of switch engines is to be provided by the Santa Fe in handling the tank car movement in the Panhandle district, and with good service some of the car rack owners are counting on loading several train loads of crude daily from one rack. An idea as to the volume of crude that can be shipped through single racks is lilustrated by the fact that the Marland Pipe Line Company has averaged 30,000 barrels daily over its 50 car rack at Panhandle, with the crude coming to this point via an eight-inch line from pump station in Hutchinson County, a distance of 30-odd miles. Gulf has moved as high as 20,000 barrels daily from its 40-car rack at Panhandle, with a similar pumping arrangement as Marland. Switching service and pressure behind the oil going into the tank cars determine the amount of crude that can be loaded daily, while the average tank car has a capacity of 200 barrels. Most of the tank cars in service in the Panhandle are equipped with steam coils to permit quick unloading during the cold weather.

The Rock Island Railroad is building into the Carson-Hutchinson County oil area from Amarillo to Liberal, Kansas, but it is not expected to be in position to handle freight for nearly a year. This carrier is providing the outlet for crude being produced in the Shamrock field, Wheeler County, where Humble and Mid-West Exploration Company have small car racks.

Geophysics to Be Taught At Colorado School Of Mines

Denver, Colo.—The establishment of a department of geophysics in the Colorado School of Mines at Golden, Colorado, represents one of the greatest advances in technical education ever made in this country, according to opinions of members of the American Petroleum Geologists recently meeting in Denver.

The geophysics department for the Colorado School of Mines has recently been announced by President Coolbaugh, following the arrangement of plans for Dr. A. C. Heiland, one of the world's leading geophysists, the be in charge of the department. The course will embrace the use of the torsion balance, seismograph, magnotomic and electric methods for scientific prospecting of oil and other mineral deposits. When instruments are available at Golden practical and theoretical courses in geophysical methods will be started for the benefit of seniors and special students. Actual work is expected to begin to January.

Dr Heiland comes to the Colorado School of Mines for the purpose of complete some research problems. He is a graduate of Heidelberk University and obtained his doctor's degree a tthe University of Hamburg. He has been connected with Askania Verke, manufacturers of a geophysical instruments in Berlin for several years, and has represented this company in the United States for the past few months.

In a talk recently before the senior petroleum and geological students of the Colorado School of Mines, John F. Weinzierl, chief geologist for the North American Exploration Company of Houston, in discussing the growing use of geophysical instruments and the valuable discoveries made from the use of these instruments, stated that Dr. Heiland was one of the greatest authorities in the world on the subject of geophysics.

PERSONAL MENTION-MEN YOU KNOW

Texas Wins Golf Game

The aspirations of Ray McGrew, vice president of Standard Oil Company of Louisiana, and M. O. Rife, general superintendent of production for the Gulf Refining Comany, to add to their honors as golf players were nipped in the bud last week. Lee Wilson, drilling contractor of Wichita Falls, issued a challenge some months ago to take on the two Shreveport production superinendents for a game, with the stipulation that Wilson's partner was to be a drilling contractor from Texas.

Wilson journeyed over to Shreveport Wednesday along with his partner, who was introduced as Mr. "Duggan." The visiting contractors made a poor showing at the start, and the prize money promised to be a cinch for the production superintendents, until Wilson nudged the said Mr. Duggan to cut loose with his best stuff. Duggan made shots that are somewhat rare for the Shreveport course, and piled up a score that soon convinced the superintendents that they had been framed. Admitting defeat, McGrew and Rife were then informed that Duggan was in reality the well known Tommy Cochran, former amateur champion of Texas. The bets held good, as Cochran is a drilling contractor in the North Texas district.

N. H. Shillman, of the States Engineering Company, Baltimore, Maryland, spent several days in Houston last week in the interest of his company. While in Houston, Mr. Shillman concluded arrangements with the W-K-M Company to distribute the Senco Gauge, a States Engineering Company product, that is having a wide sale in the oil country. W-K-M. is a prominent Houston concern with representatives in important fields of the country.

A. H. Llwyd, scout for the Prairie Oil & Gas Company in the Burbank field, Oklahoma, has been transferred to Texas and placed in charge of a new scouting district created by Prairie in Mid-Western Texas, centering around the Phillips Petroleum Company's wildcat oil producer in Jones County. Llwyd will make his headquarters at Abilene.

A. B. Steen, chief engineer for The Texas Company and one of the leading autohrities on petroleum engineering problems, has been. loking over the Rocky Mountain properties of the company during the past week. The decline of gas pressure in some fields in the district has been expensive to the Texas interests, along with other leading companies. Mr. Steen met with local Texas engineers to discuss matters affecting better production methods.

R. A. JOSEY

R. A. Josey, president and organizer of the Josey Oil Company of Tulsa, one of the largest and most successful independent oil companies in the Mid-Continent field, has become associated in Houston with the Republic Bond and Mortgage Company and the Republic Realty Company. Mr. Josey is vice-president of both concerns. Starting in the Spindletop field in Texas in 1901, Mr. Josey has acquired his oil field experience through a succession of operations in various parts of Oklahoma, Kansas and Texas. He came to Oklahoma from Beaumont and first located in Muskogee in the oil business and afterwards was vice-president of the Exchange National Bank of that city. Later he moved to Oklahoma City and for some years centered his business interests there and later brought them to Tulsa where they now are included in the properties of the Josey Oil Company. Born at Huntsville, Texas, Mr. Josey is a graduate of the Sam Houston State Normal at that place. He enjoys a very wide acquaintance among oil men not only in the Mid-Continent but in other sections as well.

E. M. Frid, of the U. S. Tool Company, Signal Hill, California, is on an Eastern tour.

Miss Elizabeth MacIntyre recently arrived in Cartagena as an employee of the South American Gulf Oil Company, serving as secretary to the general manager of that company in Colombia, Isaac Manning. Miss MacIntyre was formerly with the firm of Burnett & Burnett, New York attorneys, and is the first American lady to be officially connected with the oil interests in Colombia.

R. T. (Bob) Markham, well known for his connection with the Tulsa office of the Prairie Oil & Gas Company, is now private secretary to Frank Phillips, president of the Phillips Petroleum Company, at Bartlesville.

W. H. "Bill" Dwyer, manager of the branch office of the United Iron Works, Inc., at Dallas, Texas, has been placed in charge of sales and construction work in the entire Mid-Coneinent district through the addition of Oklahoma and Kansas to his territory recently. Bill will have C. B. Lynde as assistant, and will continue to make Dallas his headquarters.

Nowood Test Shows

Cosper, Wyo.—The Carter Oil Company has encountered a small quantity of oil in its test of the Nowood structure, section 5-48-90, 50 miles northeast of Thermopolis, Wyoming. The top of the sand showed signs of oil. Deeper drilling disclosed partial saturation of the sand. Nowood dome is located in the midst of several black oil structures.

New Wells Boost Huntington Townsite Production to 12,800 Barrels

Total of 51 operations below 3000 feet passing up shallow stratum for deeper pay

By GEORGE REID
Staff Representative

Los Angeles, California.—Of the 19 drilling operations reoprted last week to be nearing the deeper zone and in line for early completion in the Huntington Beach townsite area, six have entered the producing oil well class.

The Superior Oil Company claims leadership this week in number of wells completed in that it contributed four producers from the deep pay at Huntington Beach. Superior's Fee No. 1 was finished October 10 at 3860 feet, flowing 425 barrels of 22.5 gravity oil. Two days later the Superior Oil Company completed two additional wells. Chudnow No. 1 came in for 1300 barrels of 24 gravity oil from the depth of 3963 feet, and its Gillette No. 1 was completed at 3928 feet, producing oil of the same gravity. Superior also completed its Babbit No. 1, producing 400 barrels from 4002 feet.

The McKeon Oil Company contributed one well during the week ending October 15 in the completion of its No. 1 from a depth of 3988 feet. The well came in producing 1550 barrels of 22 gravity oil and 300,000 cubic feet of gas. This well has a producing zone of over 400 feet and it is expected that it will be long lived.

Hogan and Lytle, in completing their Huntington Beach No. 1, contributed the sixth well of the week. Huntington Beach No. 1 is producing from 3960 feet, flowing 24 gravity oil at the rate of 1450 barrels.

Completion of these six wells increased the production from the townsite area almost 5,000 barrels and brings the total production for the district to about 12,800 barrels daily, from a toal of 34 wells, or an average of 376 barrels per well for the new field. Only two of the 34 completions are producing from the shallow zone. Standard Oil Company's Pacific Electric No. 2 and the Superior Oil Company's No. 2, the discovery well, are still pumping from the upper zone. The remaining 32 wells are all deep sand producers.

There are 51 operations in various stages of development at present below the 3000 foot level, none of which is seriously testing the upper stratum, but are speedily drilling ahead to the deeper sand.

Nearing Completion

Of the 51 deeper operations at Huntington Beach townsite 13 are nearing completion between the depths of 3800 and 4000 feet. The Ambassador Petroleum Company has carried its Huntington Beach No. 9 down to 3934 where it is reported reaming. California Petroleum Corporation's Lewis Community No. 1 is reported at 4000 feet preparing to cement perforated. Its McIntire No. 1 is drilling in shale at 3978 and its Playen No. 2 is reaming at 4000 feet. California Pet's Turner No. 1 reported an oil sand at 3900 feet and is waiting orders. George F. Getty is drilling in shale at 3975 in his well No. 6, which is the next Getty well scheduled for completion.

E. J. Miley Oil Company should have another producer in the deep zone before many days, as its Pacific Electric No. 3 is drilling ahead at 3880 feet.

Petroleum Securities Company is also scheduled for an early completion with its Gross No. 2 which has set 10-inch casing and is drilling ahead in shale at 3934 feet. Petroleum Securities also has nine operations under way between the depths of 3600 and 3800 feet and two wells drilling at shallower depths.

The Standard Oil Company in its H-5 has reached the interesting depth of 4034 feet and is drilling out cement. This should be the Standard's next completion, as its H-4 is standing cemented at 3986 feet. Standard has six more operations at various depths between 3000 and 3700 feet.

In adddition to the four completions contributed by the Superior Oil Company this week, the Superior is well under way with several operations. Its Schouller No. 1 is nearing the deep pay and drilling in shale at 3930 feet. Its Fee No. 2 is standing cemented at 3399, and its Gillette No. 2 has carried 11-inch past production at 3295 feet. Nixon No. 1 and Stever No. 1 are drilling at 3519 and 3190 respectively.

U. S. Royalties No. 1 is drilling in shale at 3730 and the Wilshire Oil Company is drilling at about 3900 feet in its Huntington Beach Nos. 3 and 4. Wilshire's Huntington Beach No. 2 is reported as drilling in shale at 3665 feet.

51 Below 3000 Feet

Of the 51 operations working below 3000 feet, 26 are drilling at various depths between 3400 and 3800 feet and 13 and are working between 3000 and 3400 feet. Julian Petroleum Corporation has four wells in the above classes and judging from their depths they should all be completed at about the same time. California Petroleum Corporation, McKeon Oil Company, E. J. Miley Oil Company, Petroleum Securities Co., Standard Oil, Superior, United and Wilshire Oil Company, are among the others whose operations include several wells each, drilling between 3000 and 3500 feet.

A review of the field shows that there are 25 rigs up, 5 rigs building, five foundations and nine locations, at present which indicate the beginning of some 43 new operations in the near future. During the past week three new wells were spudded in this area. Paul Getty spudded in his No. 1 well October 11 and is drilling in sand and gravel at 280 feet. Julian Petroleum Corporation also spudded its Campbell No. 1 October 11 and is drilling in like formation at 230 feet. Petroleum Securities spudded its Doyle No. 1 October 8 and is drilling at 506 feet.

Operations in the townsite area include 120 wells driling, four idle and one abandoned. Thirty-four producing wells are listed, of which the Standard Oil has 24. Although this company has over two-thirds of the producing wells, it is producing but slightly over one-third of the oil. George F. Getty has two wells producing about 1500 barrels daily. E. J. Miley Oil Company has one, McKeon Oil Company has one, Wilshire one, Hogan and Lytle one, and Superior Oil Company has four. Total production for the field is given at 12,800 barrels, or an average of 376 barrels per well.

The deep test well of the Standard Oil Company on its Bolsa Chica lease, termed No. 23, which is an extreme northwest extension test of the oil field, has been drilled to 6755 feet and is beginning to attract attention as a deep test. The showings and indications at this depth, however, are not conducive to especial encouragement. It is reported that the Standard may carry this well on down as a deep survey hole as long as mechanical conditions will permit successful drilling.

The Ventura Avenue field continues to yield wells of the gusher class, and since the completion of the Associated Oil Company's 5000 barrel well at 6261 feet three weeks ago, the Shell Company of California has contributed another excellent producer in this area. The Shell Company completed its

(Continued on page 78.)

Effect of Dissolved Gas Upon Viscosity and Surface Tension of Crude

By C. E. BEECHER and I. P. PARKHURST
*Petroleum Engineers, Empire Gas and Fuel Company**

IN the course of the experimental and development work of Henry L. Doherty in an endeavor to obtain an increased yield of oil from oil-bearing sands, it was Mr. Doherty's claim and contention that oil in an undisturbed pool was different in character and behavior than the same oil when raised to the surface of the earth, and that the gas dissolved in the oil caused a marked reduction in its viscosity and surface tension. Prior to 1924 no information to support this contention could be found in the literature or by a discussion of the subject with technical men in government and private laboratories. So far as could be ascertained no experimental work had been carried on to indicate that Mr. Doherty's claim was either right or wrong. All parties consulted agreed that the viscosity of the oil would be affected by gas dissolved therein to the extent that natural gasoline was present in the gas, but so far as could be determined any additional effect of the natural gas was unknown.

Accordingly, it was necessary to devise equipment and carry on experiments which would either prove or disprove Mr. Dohrety's contention or claim. Such apparatus was built under Mr. Doherty's direction and experiments were carried on to determine definitely the viscosity and the surface tension of the crude oils which contain dissolved gases under different pressures. The results of the experimental work carried on have proved that the claim and contention of Mr. Doherty were correct in every particular, as will be seen from the discussion of the subject and the data contained in this paper.

Reduction of Viscosity by Dissolved Gas

At a pressure of 500 pounds, and a temperature of 70 degrees F., it was found that a natural gas such as is associated with the oil would reduce the viscosity about 50 per cent when a given crude oil was saturated with the gas. Increasing the pressure another 500 pounds could not be expected to reduce the viscosity the remaining 50 per cent. However, some reduction in viscosity would take place as indicated by the curves showing the relation between pressure and relative viscosity. Pressures of 1800 pounds may exist at depths around 4100 feet and at present a large amount of oil is being produced from much greater depths. Under such pressures sufficient gas might dissolve in the oil to make the viscosity almost equal to that of kerosene.

Viscosity is the most important physical quality of oil which retards its flow through a pipe line or through the small irregular openings of the average oil sand; therefore, if some method of producing oil can be devised such that a major portion of the gas will remain in solution and the oil retain its fluidity it is possible that the volume of oil recovered from the sands can be greatly increased.

Reduction of Surface Tension

The surface tension of crude oil is reduced by dissolved gas. The results of experiments with two different crude oils saturated with gas at pressures from 400 to 500 pounds indicate a reduction of approximately 20 per cent in the surface tension of the oils.

Many of the small openings in an oil sand are of capillary size and hold a large percentage of the oil which is not recovered by present production methods. As the dissolved gas escapes from the oil the surface tension increases and likewise the capillary force which holds the oil within the sand. We are not prepared to say that surface tension is the only factor that holds the 80 per cent of the original oil in the sands. If, however, surface tension should be the only force and if by keeping the gas in solution the surface tension could be reduced by 20 per cent then we might expect an 80 per cent greater ultimate recovery from the sands.

A great volume of oil must flow through the sands at a rapid rate and for some distance to account for the large production of some wells. The expulsive force of natural gas dissolved in and associated with the oil, the rock pressure, the reduction in viscosity due to increased earth temperatures and other factors do not alone offer an explanation of the large gusher wells. It is believed that the flow of oil through the sands in such large volumes is only possible because of the reduced viscosity and surface tension of the oil resulting from the gas in solution.

It is the purpose of this paper to give some of the results obtained from the experimental work on the solubility of gas in oil under pressure and the changes in the viscosity and surface tension of the oil. The authors wish to acknowledge the many helpful suggestions offered by A. W. Ambrose and Robert G. Griswold.

Method and Apparatus for Determining Solubility of Gases in Oils

The apparatus used for determining the amount of gas dissolved in oil under pressure is shown in Fig. 1. It consisted essentially of a large chamber A, and small chamber B, connected at each end as shown. The total void space in the apparatus was 45 cubic inches. Chamber B had a

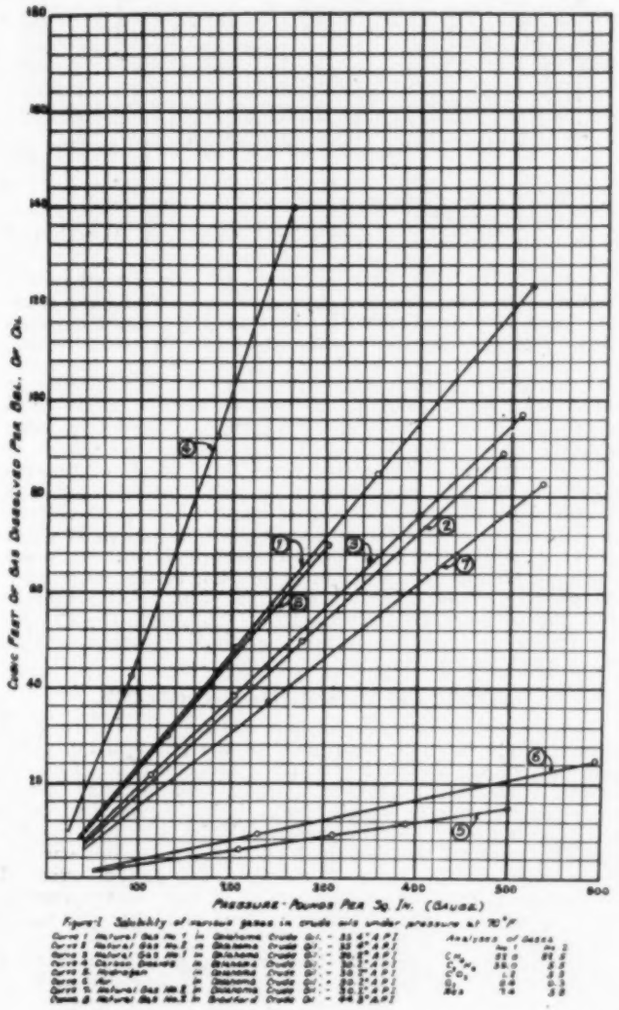


Figure 1. Solubility of various gases in crude oils under pressure at 70°F.

*Paper presented before the Tulsa meeting of the Petroleum Division of the A. I. M. E. Copyright 1926 by the American Institute of Mining and Metallurgical Engineers, Inc.

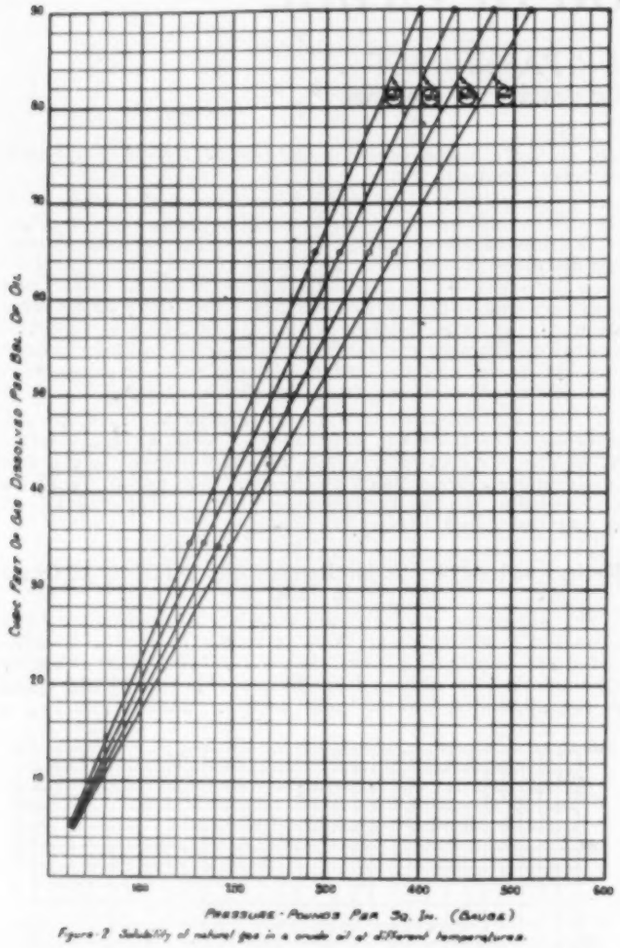


Figure 2. Solubility of natural gas in a crude oil at different temperatures.

capacity of 14 cubic inches when the valves at each end were closed. The method of operation was as follows:

Approximately 20 cubic inches of oil was placed in the apparatus and the gas pressure applied. The whole apparatus was then agitated to insure intimate contact between the oil and gas. As the gas absorbed, the pressure dropped until the oil was completely saturated. When this point was reached, the entire apparatus was placed in a constant temperature bath for sufficient time to further insure complete saturation. Chamber B was then completely filled with the gas-saturated oil and after closing the valves at each end, it was disconnected from the balance of the apparatus. The gas was allowed to escape slowly and was measured by the displacement of water. The total volume of gas recovered was the amount that dissolved in 14 cubic inches of oil at the final pressure recorded before disconnecting chamber B. A slight error is here introduced for the volume of oil saturated with gas was a little greater than the volume of unsaturated oil. Therefore the gas recovered from Chamber B was contained in some volume of oil slightly less than 14 cubic inches.

Solubility of Natural Gas in Crude Oil

The amount of nautral gas that will dissolve in crude oil depends upon both the character of the gas and the character of the oil, if other conditions are constant. For example, a natural gas consisting mostly of methane is not as soluble as one in which some of the heavier hydrocarbons, such as ethane, are present. This is shown graphically by curves 1 and 2, Fig. 2. The same oil was used in each case but for curve 1, showing the gas of greatest solubility, the gas contained only 52 per cent methane, while in curve 2, the methane content of the gas was 82.5 per cent.

All analyses of natural gas referred to in this paper were made by the combustion of gas in an atmosphere of oxygen. The results, therefore, do not represent the true amount of methane and ethane present, but do show whether the light or heavy hydrocarbons tend to predominate.

For any given gas, the volume that will be dissolved depends upon the character of the crude oil, if other conditions are constant. The lighter gravity oils dissolve more gas than the heavier oils. This is illustrated by curves 1 and 3, Fig. 2. These curves show a difference in solubility of approximately 20 per cent. for the same gas in in oils of 35.4 and 30.2 degrees A. P. I. gravities, respectively.. As a further example, curves 7 and 8 show a difference of approximately 32 per cent. in the solubility of the same gas in two different oils.

Solubility of Other Gases in Crude Oils

A few experiments were conducted to determine the solubility of gases such as carbon dioxide, hydrogen and air in crude oils. Carbon dioxide was found to be more soluble than natural gas, while hydrogen and air are only slightly soluble, the hydrogen being less soluble than the air. Curves 4, 5, 6 and 7 in Fig. 2, show the relation between the pressure and the volume of gas dissolved in the same crude oil for carbon dioxide, hydrogen, air and a dry natural gas, respectively.

For this particular oil and gas was found to be approximately four times as soluble as air, but only one-third as soluble as carbon dioxide. A similar ratio will probably apply to other crude oils.

Since the experiments referred to in this paper were completed, Dow[1] and Calkin have conducted a series of experiments to determine the solubility of a practically pure methane gas and of air in various crude and refined oils. The results of their work sustain those given in this paper.

Rock Pressure and Volume of Dissolved Gas.

Rock pressures of 1000 pounds per square inch or greater, are not uncommon in many oil fields, and at such pressures, the volume of gas dissolved in the oil should be at least twice as great as that obtained from the laboratory experiments with pressures around 500 pounds per square inch. Table 1 has been prepared to show the cubic feet of gas dissolved in a barrel of oil at pressures from 300 to 1000 pounds per square inch.

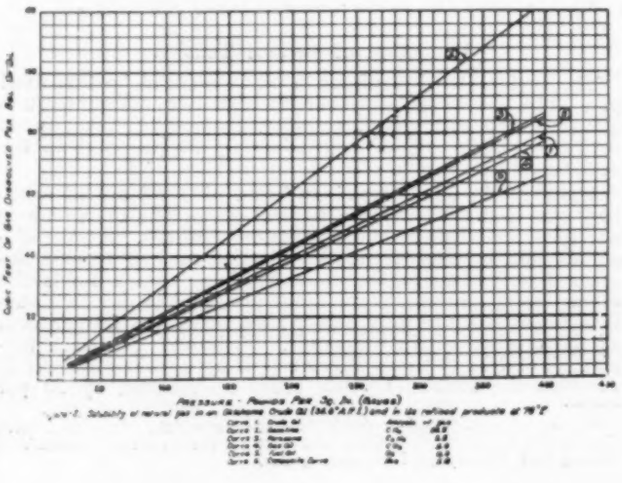
Table 1.—Cubic Feet of Gas Dissolved in a Barrel of Oil at Different Pressures

	Oklahoma Crude 30.2° A. P. I.				Oklahoma Crude 35.4° A. P. I.	
Gage Pressure Lb./Sq.in	Gas No. 1	Gas No. 2	Air	CO^2	Gas No. 1	Gas No.2
300	57.0	46.5	12.3	161	71	54
500	95.0	77.5	20.5	276	118	90
1000	190.0	155.0	41.0	563	236	180

Note—See Fig. 2 for analyses of gases.

Effect of Temperature on Solubility of Gas in Oil

Other conditions remaining constant, the quantity of gas that will dissolve in oil depends upon the temperature. The relation between pressure and the volume of natural gas dissolved in a crude oil at various temperatures from 50



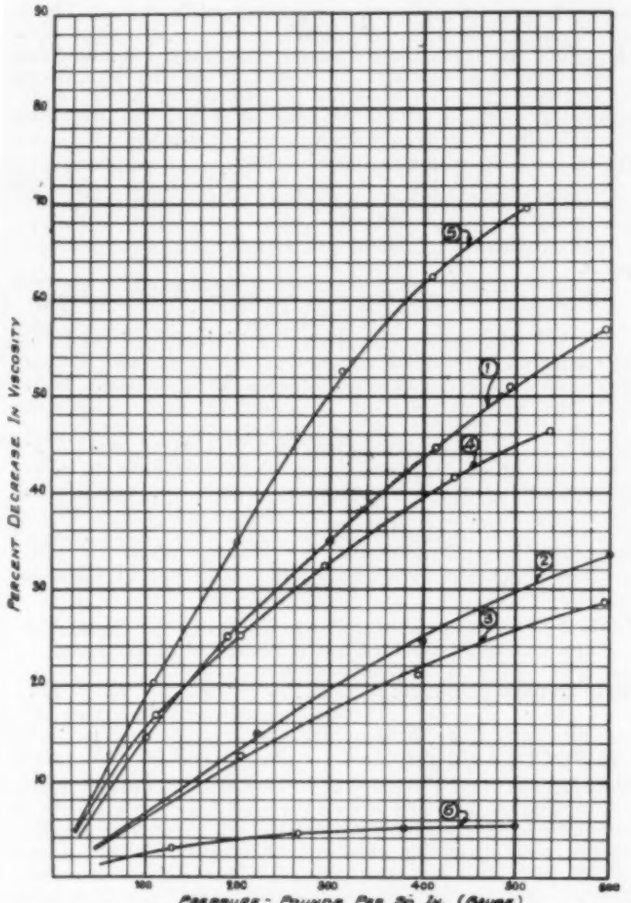
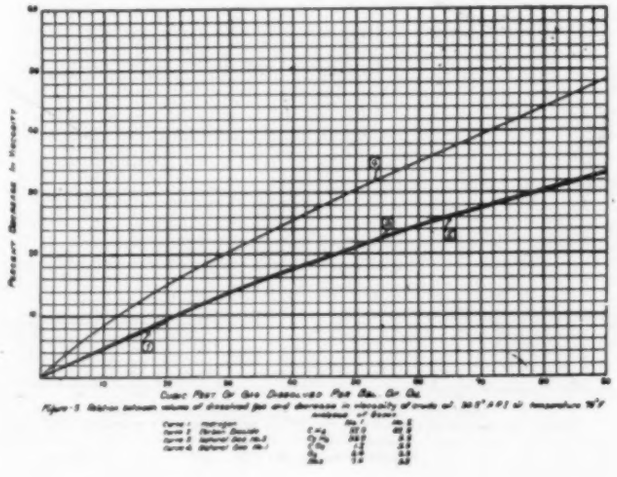


Figure 4. Decrease in viscosity of crude oils containing gases dissolved under pressure.

			Analysis of Gases	
			No. 1	No. 2
Curve 1.	Natural Gas No. 1	in Oklahoma Crude Oil. - 36.5° A.P.I.		
Curve 2.	Natural Gas No. 2	in Oklahoma Crude Oil. - 36.5° A.P.I.	CH_4 82.0	82.6
Curve 3.	Natural Gas No. 2	in Oklahoma Crude Oil. - 38.4° A.P.I.	C_2H_6 9.0	5.5
Curve 4.	Natural Gas No. 1	in Oklahoma Crude Oil. - 38.4° A.P.I.	CO_2 1.2	4.8
Curve 5.	Carbon Dioxide	in Oklahoma Crude Oil. - 36.5° A.P.I.	O_2 0.4	0.5
Curve 6.	Hydrogen	in Oklahoma Crude Oil. - 36.5° A.P.I.	Res. 7.4	6.6

to 110 degrees F. is shown by the curves in Fig. 3. As the temperature increases the amount of gas that can be dissolved in the oil decreases, but even at the higher temperatures, large quantities of gas will dissolve in the oil. For example, at a pressure of 400 pounds and a temperature of 90 degrees F., approximately 75 cubic feet of gas was dissolved in a barrel of oil, whereas at a temperature of 110 degrees F., 70 cubic feet of gas was dissolved in the same oil.

[1]D. B. Dow and L. P. Calkin: Solubility and Effects of Natural Gas and Air on Crude Oil. Rpt. of Investigations, Bur Mines. Ser. No. 2732 (Feb., 1926).

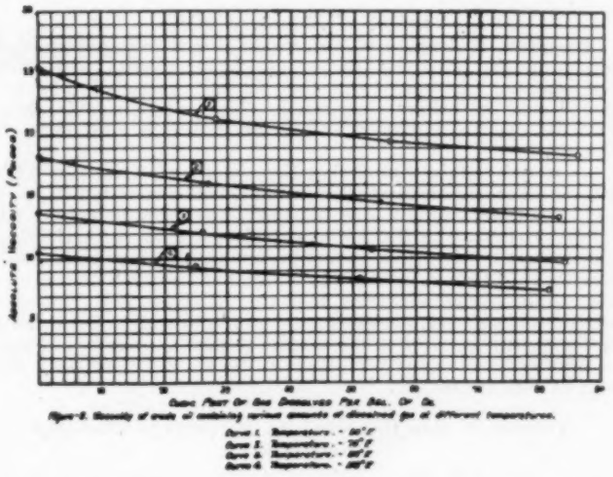


Solubility of Gas in Crude Oil and Its Components

Natural gas was dissolved in a crude oil and the various major products obtained from this oil, including gasoline, kerosene, gas oil and fuel oil. The curves showing the relation between pressure and volume of gas dissolved are reproduced in Fig. 4. Knowing what percentage of the crude oil each product represented and the volume of gas dissolved in each, it was possible to compute a composite curve. This curve (curve 6, Fig. 4) indicates a greater solubility than for the gas in the crude oil (curve 1, Fig. 4). Several factors may account for this variation: There may be an error in the percentage of the total oil represented by each refined product; the volume of gas shown as dissolved in the gasoline is probably a little high because some of the higher gasoline fractions may have distilled off with the gas, and some cracking may have taken place so that the refined products actually differ in composition from the original oil. It is also possible that the solubility of the gas in any one of the products from the crude oil may be changed by the presence of the other products. This experiment again demonstrates that natural gas is more soluble in the lighter oils.

Apparatus for Determining Viscosity of Crude Oil Containing Dissolved Gas

The viscosity of crude oil is commonly determined by the Saybolt viscosimeter. This apparatus, however, is not designed to measure viscosity under pressures other than



atmospheric; therefore, to determine the viscosity of oils containing dissolved gas under pressure, it was necessary to construct a viscosimeter that would operate under high pressures. Fig. 5 shows the details of the pressure viscosimeter used. It was operated in the following manner:

A fixed quantity of oil was placed in the apparatus through Valve F, then gas was introduced under pressure through the same valve, and the apparatus agitated until oil was completely saturated. The temperature was controlled by means of a constant temperature bath in which the entire apparatus was placed. To obtain the viscosity the apparatus was inverted until the oil had drained into chamber A through tube B. It was then inverted and the oil chamber A started to flow through capillary tube C into the bottom chamber. The time required for the fluid level to rise from mark D on the lower gauge glass to mark E on the upper glass was taken. This time can be converted into Saybolt seconds by means of a calibration curve giving the relation between the Saybolt time and the pressure-viscosimeter time.

By means of tube B the pressure is equalized throughout the apparatus. This tube is much larger than the capillary tube C and thus permits the oil to flow readily into chamber A when the viscosimeter is inverted. Capillary tube C is 1/16-inch diameter and 2 inches long, and is

drilled through a solid piece of brass as shown in the details sketch in Fig. 5.

Effect of Dissolved Gas on Viscosity of Crude Oil

The viscosity of crude oil is greatly reduced when the oil contains gas in solution. The decrease in viscosity depends upon the amount of gas dissolved in the oil if other conditions are constant. An oil with high initial viscosity will show a greater relative decrease for a given amount of dissolved gas than one with a lower initial viscosity.

Fig. 6 shows the relation between pressure at which various oils were saturated with various gases and the percentage decrease in viscosity of the oil. The viscosity decreases with an increase in pressure, because more gas is dissolved at the higher pressure. Curves 1 and 2 are for the same oil, but with a different gas in solution; the same is also true of curves 3 and 4. Under the identical conditions, the gas dissolved in the oils as shown by curves 1 and 4 is more soluble than the gas dissolved in the oils for curves 2 and 3, and therefore at the same pressure produced a greater reduction in the viscosity of the oils.

Curves 2 and 3 indicate the reduction in viscosity that resulted when the same gas was dissolved in the different oils. The gas is more soluble in the oil for curve 3 than in the oil for curve 2, but the reduction in viscosity is less. The inital absolute viscosity of the oil for curve 2 is approximately 3½ times greater than that for the oil of curve 3.

Curves 5 and 6 show the reduction in viscosity when carbon dioxide and hydrogen respectively, are dissolved in the same oil. Carbon dioxide is extremely soluble and therefore produced the greatest reduction in viscosity at a given pressure.

Effect of Dissolved Air

An effort was made to detremine the effect of dissolved air upon the viscosity of an oil. The results were not consistent. In some tests the viscosity was slightly reduced and in others, increased. The increased viscosity may be due to oxidation of the oil when in contact with the air.

Dow and Calkin[2] found that the viscosity of two oils with which they experimented was increased when containing air in solution and in one oil the viscosity was decreased. They attribute the the increased viscosity to the oxidizing effect of the air when in contact with the oil under high pressure. It is of interest to note that the two oils showing an increased viscosity had an initial Saybolt viscosity of 550 and 577 sec. at 100 degrees F., while the oil showing a decrease in viscosity had anitial viscosity of only 284 sec. a decrease in viscosity had an initial viscosity of only 284 sec. at 100 degrees F.

Volume of Gas Dissolved vs. Percentage Viscosity Reduction

The curves in Fig. 7 show the relation between volume of gas dissolved and percentage reduction in viscosity for different gases dissolved in the same oil. Fur curves 1, 2 and 3, hydrogen, carbon dioxide and a natural gas consisting largely of methane, were dissolved in the oil. These curves nearly coincide. While there is not sufficient data on which to base a conclusion, they may indicate that equal volumes of comparatively pure gases dissolved in an oil will cause equal reductions in viscosity if other conditions are constant. This assumption could not apply to gases such as oxygen which would probably cause an increase in viscosity due to oxidation.

Curve 4 shows the viscosity reduction when a natural gas with a low-methane and a high-ethane content is dissolved in the same oil. For equal volumes of dissolved gas, the reduction in viscosity is less for the pure or simple gases.

Effect of Temperature on Viscosity of Oil Containing Dissolved Gas

As the temperature increases, the viscosity of crude oil decreases and at higher temperatures less gas will be dissolved in the oil, if other conditions are constant. However, the relative decrease in viscosity is approximately the same for an equal volume of a given gas dissolved in the oil at different temperatures. This is illustrated by the curves in Fig. 8, which show the relation between absolute viscosity and volume of gas dissolved at different temperatures. As a further illustration, Table 3 has been prepared from the data shown by curves in Fig. 8, to show the present reduction in viscosity when an equal volume of gas is dissolved in the same oil at different temperatures.

Table 2—Percentage Reduction in Viscosity for Equal Volumes of Gas Dissolved in the Same Oil at Different Temperatures

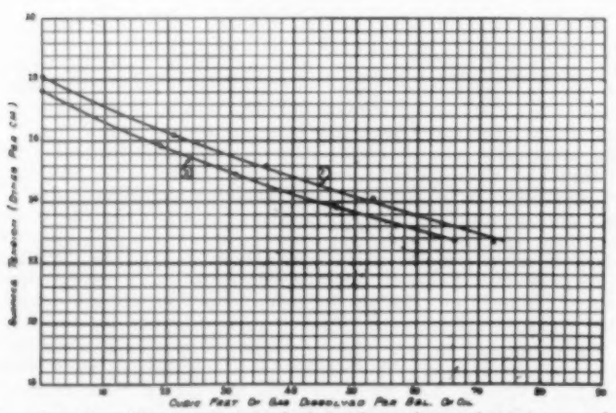
Temperature, °F	50	70	90	110
	Percentage reduction in viscosity			
Gas dissolved bbl. oil, 40 cu. ft.	17.6	16.4	18.5	17.9
Gas dissolved bbl. 80 cu. ft.	26.7	26.8	29.0	30.2

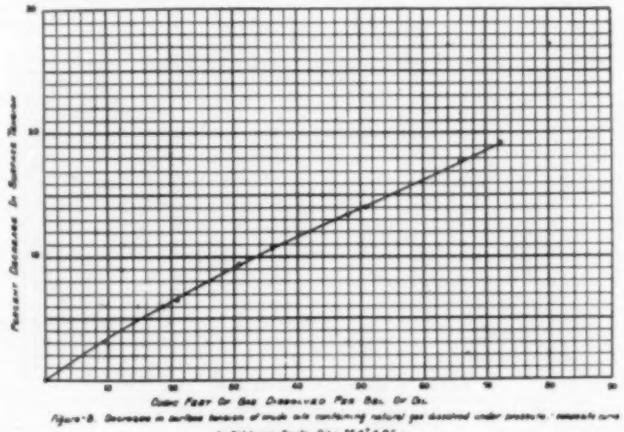
Relation Between Viscosity and Flow of Oil Through Sands

Viscosity is the most important physical characteristic of crude oil which effects the rate of flow through a pipeline or the small irregular openings of a saind. The quantity of oil that will flow through such openings is inversely proportional to the viscosity, other conditions remaining constant, while the pressure required to produce a given flow varies directly as the viscosity.

A thin fluid of low viscosity such as kerosene will flow through the sands with little resistance compared to that of a viscous crude oil. But, if gas is dissolved in the oil the viscosity will be reduced and the oil will become thinner, approaching the consistency of kerosene as the volume of dissolved gas increases. It is estimated that the viscosity of the two oils used in the experiments would be reduced from 40 to 70 per cent. when saturated with natural gas at a pressure of 100 pounds per square inch. Under these conditions, the oil will be extremely thin and flow through the sands with much less resistance. For example, if the viscosity of the oil should be reduced 50 per cent. twice as much would flow through the sands if other conditions remain constant, or one-half of the pressure would be required to force an equal amount through the sand.

[2]Op. cit.





In general, no special effort is made by present production methods, to produce oil with a minimum amount of gas or to retain part of the gas in the sands under pressure such that it will remain in solution with the oil and thus reduce the viscosity and surface tension of the oil. If a larger percentage of oil is to be recovered from the sands more thought must be given to the efficient utilization of the gas dissolved in and associated with the oil.

Method of Determining Surface Tension of Crude Oil Containing Dissolved Gas

Surface tension measurements were made by the capillary-tube method in the following manner. The height to which an oil would rise in a capillary tube was determined. The oil was then saturated with gas under pressure and capillary rise observed. Similar determinations were made with the oil saturated with various amounts of gas. The relative surface tension was determined by the height to which the oil would rise in the capillary tube. The absolute surface tension was determined by calibrating the capillary tube with a liquid of known surface tension.

The surface tension of crude oil is reduced by dissolved gas. Fig. 9 shows the relation between the volume of gas dissolved in two different oils and the surface tension in dynes per cm. These curves are approximately parallel. The difference appears to be caused by a variation in the initial surface tension. The relation between percentage reduction in surface tension and the volume of dissolved gas for both oils is shown by the one curve in Fig. 10. This indicates that equal volumes of the same gas dissolved in each oil caused the same relative decrease in surface tension. Insufficient information is available to justify drawing any such conclusion.

Relation Between Surface Tension and Recoverable Oil

A large percentage of oil which present production methods fail to remove from the sands is held by capillarity. As the gas dissolved in the oil escapes, the surface tension is increased and, likewise, the capillary force which is a measure of the surface tension. If this increase in surface tension could be prevented during the process of extracting oil from the sands, a greater volume of oil should be recovered.

Low Gas-Oil Ratios Mean Greater Ultimate Recovery

Discussion of the paper presented by Messrs. Beecher and Parkhurst

By T. E. SWIGART
Production Superintendent, Shell Company of California

THE paper by Messrs, Beecher and Parhurst presents data of great value and they are to be congratulated upon the thoroughness with which they have handled their subject. Data relating to the absorption of different gases in oils and resultant effects upon the properties of the oils is particularly useful at this time when application of the Marietta Process is becoming general.

In 1922 while experimenting with back pressure on pumping wells in Northern Osage County, Oklahoma, the writer recognized the possibile beneficial effects from lowered viscosity of crude oil underground through the presence of dissolved gas and suggested in his report* that experiments be made to determine this effect. Because of work in hand the Bureau of Mines was unable to carry on the necessary experimenting. It is gratifying to learn, therefore, that the work has been done so well for making public findings.

Several of the findings by Messrs. Beecher and Parkhurst warrant immediate consideration, because their results suggest certain operating methods that are possible of control.

They show first that more so-called "wet" gas will be dissolved by a certain oil at a given pressure than "dry" gas or air under the same conditions.

Also because this "wet" gas at a given charging pressure lowers the viscosity of a particular oil almost twice as much as "dry" gas and ten times as much as hydrogen which it appears acts almost the same as air. Later the writers show that whereas 20 cubic feet of dry gas or hydrogen dissolved in one barrel of 30.2 degrees A. P. I. oil lowers the viscosity by nine per cent, 20 cubic feet of wet gas will lower the viscosity by 15 per cent.

Such observations naturally lead the operator using the Marietta Process to inquire whether he should recycle "wet" gas and not recover natural gas gasoline which presents a definite profit, or whether he should remove the gasoline and recycle dry gas, knowing that the same amount would require a higher pressure before it could be dissolved. Also he would know that a volume of dissolved dry gas would only lower the viscosity of the oil about one-half as much as a like volume of wet gas. If no natural gas were available, would the operator be justified in using air in the Marietta Process knowing that air would be very much less effective than the gas and might even increase the viscosity of oil through oxidation?

The decision between wet and dry gas for the Marietta Process can partly be determined by operating costs. Assuming that the cost of compression is the same for both, it is necessary to add the net value of the gasoline in the wet gas when it is returned to the oil sands. The following tabulation compares the two methods of operating:

All figures assumed for purposes of illustration:

	Wet gas	Dry gas
Compression Cost including fuel per M. cu. ft.	$0.03	$0.03
Value of gas in the field per M. cu. ft.	0.10	0.10
Net value of gasoline in 1000 cu. ft. of gas	0.20	...
Total cost of introducing gas to key well per M. cu. ft.	$0.33	$0.13
Value of Gas expected eventually to be recovered, per M. cu. ft.	0.33	0.30
Cost or profit of operation per M. cu. ft.	*0.33	†0.17

Thus from the daily operating standpoint, it appears much more profitable to

*Bureau of Mines Technical Paper 322, "Experiments in the Use of Back Pressure on Oil Wells"—Page 50.
*Cost. †Profit.

introduce dry gas than wet gas. In fact, gasoline recovered from wet gas would pay compression charges four or five times over. As it does not seem probable in light of present information that the Marietta Process will more than double the recovery of oil from sands by natural means, it appears that the recovery of gasoline by the passing of dry gas through oil sand is warranted, because dry gas eventually would strip oil which could not be recovered by the Marietta Process, of its gasoline. Thus an added recovery of a natural resource would be effected.

However, it is not at all certain that this policy is best. The same amount of wet gas might give much better results in the Marietta Process than dry gas and moreover, might give these results at lower pressures. The operator who has the foresight and courage to spend thousands of dollars for compressor installations, for gas to introduce back into the sands and for current operating expenses, will be interested in appraising the possible advantage of using wet gas even though an immediate profit might be lost, if by doing so he has a reasonable chance of actually increasing the recovery of oil from the sands.

The data presented by Messrs. Beecher and Parkhurst would indicate that the use of air for the Marietta Process in much less than the use of dry or wet gas and should not be resorted to if gas can be obtained. However, most operators in the Eastern fields use air and the records of many of their projects prove that results with compressed air are well worth while.

The writers state toward the end of their paper that "no special effort is made by present production methods, to produce oil with a minimum amount of gas or to retain part of the gas in the sands under pressure." While this was true formerly it no longer holds for all operators. For example, the present producing policy of the company with which the writer is associated, namely, the Shell Company of California, is founded on the principle of producing oil with the lowest possible gas-oil ratio, in order to retard the exhaustion of natural gas from oil sands and thereby obtain more oil ultimately. This principle is accepted both by the company's executives and by the operating men in the field. Many experiments are being conducted on different kinds of wells for the express purpose of reducing the gas-oil ratios. To accomplish this, flowing wells are killed to permit tubing or other changes, present potential daily oil productions of both line or inside wells are restricted, compression costs for gas lift flowing are incurred and other seemingly unnecessary hazards and expenses are contracted. The answer to these methods of operation, is the conviction of Shell Company officials that producing with low gas-oil ratios, will result in higher ultimate recoveries from the oil sands.

Roxana Finds Air Lift Successful in Mid-Continent

By S. F. SHAW
*San Antonio, Texas**

FOR some time it has been more or less recognized within the industry that a scientific control of flowing wells would result in increased production and a greater ultimate recovery of oil. About two years ago it was proposed by the writer that this control should follow principles worked out by him while handling large air-lift operations. In the case of wells that had ceased to flow where a large quantity of liquid was present, the use of these principles would result in a large increase of production by using compressed air or gas to flow the well; in the case of a well flowing naturally it would take the form of controlling the gas associated with the oil, resulting either in immediate increase of production or in a reduction of the gas consumed per barrel of oil, and in both cases would result in a greater ultimate recovery from the sand.

The Roxana Petroleum Corporation, appreciating the advantages to be obtained by a scientific application of the principles of the air lift to oil wells, recently engaged, for a limited time, the services of the writer to work out some of the problems involved. The work was carried out at Braman, Garber and Tonkawa in Oklahoma, and at Oxford in Kansas. Following some suggestions of the writer a well was also equipped by the Roxana Company at Smackover by A. S. Field.

Increased Production by Application of Air Lift

The results of the use of this method were, as a whole, quite satisfactory, in so far as it was possible to carry out these ideas in a limited time. A total of 14 wells produced 6590 barrels before installation of the air lift and 13,847 barrels afterward, thus giving an increase of 110 per cent. The range of increase was from 5 to about 400 per cent where conditions were favorable for the use of the air lift, indicating that in many cases wells would yield a greater production of oil if the fluid were removed as rapidly as it enters the well. Most of this increase was made on wells already provided with the usual type of gas lift.

In bringing about this change in operating conditions it was arranged to remove all back pressures wherever possible. All pockets where air or gas could accumulate, and all horizontal flows were eliminated in the flow line, the gas trap being moved close to the well and placed at such an elevation that a gravity line would carry the liquid from the trap to the receiving tank. The flow column, or eductor, is of such design at the lower end as will reduce to a minimum the slippage loss that usually takes place in the lower section of the eductor pipe, and in the upper section is so designed as to reduce the friction loss in that part to an acceptable minimum. Finally, and not the least important, the wells are operated at the rate that gives the highest acceptable efficiency for the particular set of conditions involved. The calculations are too complicated to attempt to explain in a short paper; the following example will indicate the method.

Method of Calculating

Let it be assumed that in a well 3000 feet deep, when producing 2000 barrels of oil a day of 35 degrees B. (0.85 sp. gr.), the liquid column stands high enough to give a pressure of 300 pounds at the lower end of the casing. A liquid column of 35 degrees B. (0.85 sp. gr.) would represent 691 feet of water, or $691 \div 0.85 = 810$ feet of oil. The lift would then be 3000 feet less 810 feet, or 2190 feet.

The losses in lifting oil by air lift include: 1, Entrance losses at the lower end of eductor, or flow pipe, that depend on the character of the footpiece; 2, slippage losses of air (or gas) through the liquid, that depend on the design of the flow pipe; 3, friction losses of air along the inside surface of

*Paper presented to the Petroleum Division of the A. I. M. at Tulsa. Copyright 1926 by the American Institute of Mining and Metallurgical Engineers, Inc.

the flow pipe that depend on the design of the flow pipe; 4, discharge losses of air at the outlet that depend on the design of the discharge pipe and of the headpiece, or trap; and 5, other losses of unknown character that are unimportant compared with those named.

Let us suppose that the conditions in the well have permitted a design that involved the following losses: Entrance losses, 5 per cent; slippage losses, 15 per cent; friction losses, 40 per cent; discharge losses, 10 per cent; or total losses, 70 per cent. The efficiency that can be obtained when the lift is operating at 2000 pounds per day is then 30 per cent. At less than 2000 pounds per day, the losses will be changed and the efficiency correspondingly altered.

The isothermal expansion of air is practically the same as that of a perfect gas, and the quantity of the air at sea level required to lift one gallon of water is found by the following formula:

$$Q = \frac{8.55 \times L}{144 \times 14.7 \times \log_e \frac{P_2}{14.7}}$$

where Q = number of cubic feet of air to raise 1 gallon to height L;

L = feet of lift; and P_2 = absolute pressure in pounds per square inch at end of eductor.

For the conditions assumed in the problem first stated, L = 2190 feet and $P_2 = 300 + 14.7 = 314.7$ lb. per sq. in. Then

$$Q = \frac{8.35 \times 2190}{144 \times 14.7 \times \log_e \frac{314.7}{14.7}} = 2.815 \text{ cu. ft.}$$

which is the quantity of compressed air required to lift one gallon of water at sea level under pressure of 300 pounds when there are no losses. In the case assumed, the efficiency is 30 per cent and the quantity of air required is 2.815 + 0.30 or 9.383 cubic feet for one gallon of water. For oil of 0.85 sp. gr., the quantity required is 9.835 × 0.85, or 7.977 cubic feet per gallon; one barrel would require 7.977 × 42, or 385 cubic feet.

In the event that gas is used instead of air, the deviation of compressibility from a perfect gas must be taken into account. The analysis of the gas must be obtained before this deviation can be determined. The method of determination has been described by Burrell and Robertson in publications of the U. S. Bureau of Mines.

Let us suppose that the gas has an analysis that requires 375 cubic feet to lift one barrel of 35 degree oil and that

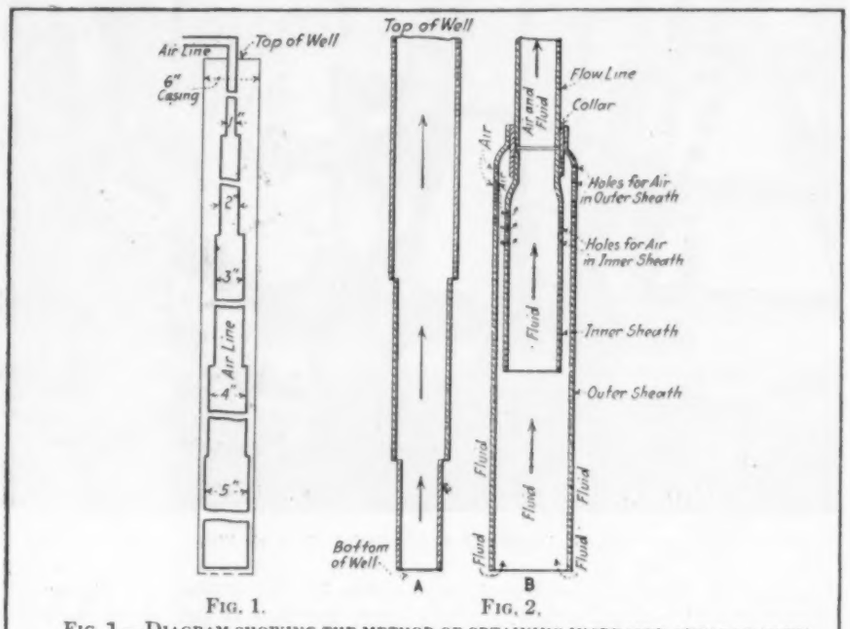


FIG. 1. FIG. 2.

FIG. 1.—DIAGRAM SHOWING THE METHOD OF OBTAINING INCREASED AREAS OF FLOW PIPE BY INCREASING DIAMETER OF AIR LINE TOWARD LOWER END. (ALLOWANCE MUST BE MADE FOR VARYING CONDITIONS IN ANY GIVEN WELL.)
FIG. 2.—SKETCHES OF FLOW LINE, *A*, AND SLOW-FLOW DEVICE, *B*.

gas from the sand amounts to 500,000 cubic feet per day when lifting 2000 barrels of oil. The total quantity of gas required per day is 375 × 2000, or 750,000 cubic feet. Deducting the 500,000 cubic feet that is being furnished by the sand, leaves 250,000 cubic feet per day that must be furnished by the compressor. If the volumetric efficiency of the compressor is 80 per cent when compressing to 300 pounds per square inch, the displacement capacity of the compressor must be 250,000 + 0.80, or 312,500 cubic feet per day, or 217 cubic feet per minute.

Data on Control of Gas Accompanying Oil

Orifice meters were placed on both the gas-input line and the gas-discharge line of some of the wells in order to determine the quantities of gas consumed per barrel of oil during the operation. The readings on the input-meter chart are fairly satisfactory, but in some cases where the discharge is fluctuating to any extent, the oscillations of the differential pressure needle are rather severe and the readings are not as accurate as could have been desired, this condition making for some apparent discrepancies. However, the general tendencies afford some valuable information on control of the gas accompanying the oil as will be noted in Table 1, which gives data on two of these wells.

It will be noted that at Well 1 there was, in general, a decrease in consumption of gas per barrel of oil lifted as the quantity lifted more nearly approached the efficient capacity of the eductor. The gas accompanying the oil from the sand showed a gradual decrease per barrel of oil, dropping from 939 to 667 cubic feet per barrel, and in Well 2 the quantity of gas was reduced to 377 cubic feet per barrel. These quantities of 667 and 377 cubic feet can be still further reduced by closer design to meet the exact conditions. In a paper read before the

Table 1.—Gas-Control Data on Two Wells in Mid-Continent Field

Well	Period	Oil per Day, Bbl.	Pressure Gage, Lb.	Gas per Bbl. Oil			Volume Gas at 100 Per Cent. Efficiency, Cu. Ft.	Efficiency, Per Cent.
				From Compressors, Cu. Ft.	From Sand, Cu. Ft.	Total, Cu. Ft.		
1	May 19 to 28	1433	250	261	939	1200	154.67	12.9
1	May 29 to June 7	1619	250	345	853	1198	160.14	13.4
1	June 8 to 17	2128	250	216	699	915	156.95	17.2
1	June 18 to 24	2497	250	222	667	889	160.14	18.0
2	July 1 to 10	404	250	606	438	1044	149.48	14.3
2	July 11 to 17	829	250	745	663	1408	160.40	12.8
2	July 18 to 24	1981	250	520	473	993	184.63	18.6
2	July 25 to 30	1994	250	445	377	822	176.44	21.4

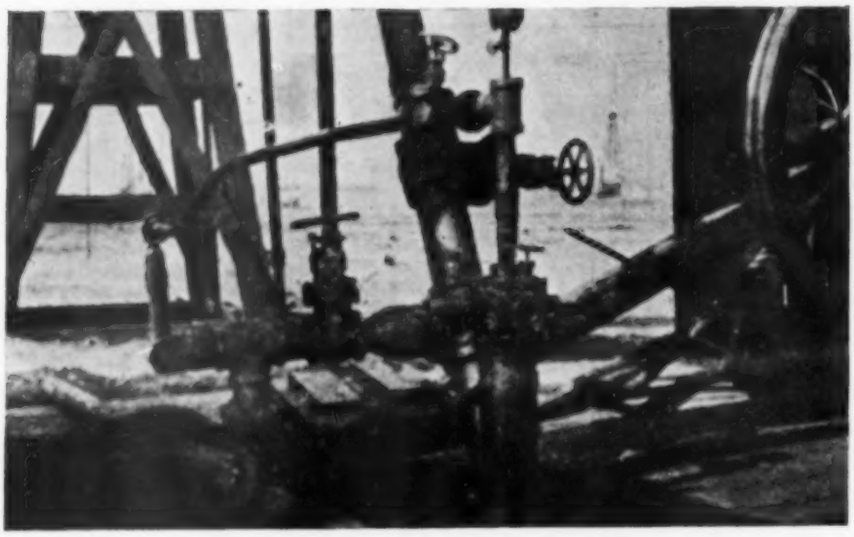


Fig. 3.—Details of an installation of an air lift

Federal Oil Conservation Board on Feb. 10 and 11, 1926, James O. Lewis estimated that the quantity of gas accompanying a barrel of oil taken as an average in all classes of wells is about 1500 cubic feet. G. O. Smith states[3] that at Dominguez Hill the input gas under 260 pounds pressure averages about 1100 cubic feet per barrel of oil, which with the 1200 cubic feet accompanying the oil makes a total of 2300 cubic feet required to lift a barrel of oil to the surface, and this is compared with the natural ratio of 2850 cubic feet per barrel for that field.

The Efficiency Factor

The gas-oil ratios afford a good basis for comparison when conditions of submergence lift and quantity of fluid are identical; when any of these conditions are varied the efficiency factor should be employed. The efficiency factor is based on the foot-pounds of work performed in lifting a barrel of liquid to the surface compared with foot-pounds of energy stored in the gas under the pressure obtaining at the lower end of the tubing. In Table 1 it will be noted that as the efficiency factor is increased, the quantity of gas taken from the sand per barrel of oil is decreased. It will be noted in Table 1 that the quantity of gas from the sand in Well 2 was considerably less than in Well 1. I suppose that the character of the sand, porosity, etc., makes for this difference. The quantity of gas that is lacking in the oil to raise it to the surface must, of course, be made up by the compressors, and it is desirable to confine the gas coming from the sand to that dissolved in the oil raised, so far as it is possible to do so, making up the deficiency by the compressors.

[3]Oil and Gas Jour. (Aug. 28, 1926.)
[4]Bur. Mines Tech. Paper No. 322.

Use of Back Pressures

It is generally supposed that back pressures in a new well result in a lower consumption of gas per barrel of oil, rather than when no attempt at control is made, and in an address before the American Institute of Mining Engineers in 1925, T. E. Swigart has given some valuable data[4] on the use of back pressures in the Dominguez Hill field, California. Let us compare the two wells A and G, noted by Mr. Swigart which were flowing through a bean under conditions of pressure and lift approximating those for wells 1 and 2 in the Mid-Continent field. The figures for these two wells are given in Table 2.

The gas-oil ratios in Table 2 are about as satisfactory as can be obtained when employing back pressures at gage pressures of 225 and 260 pounds, respectively. The quantity of gas dissolved in a barrel of oil under these conditions of pressure is about 44 and 39 cubic feet, respectively, consequently there must be abstracted from oil not lifted 1731 cubic feet of gas for each barrel of oil lifted in Well A, and 2251 feet in Well G. A comparison of these figures with those obtained in Wells 1 and 2 in the Mid-Continent, and with the work now being done at Dominguez Hill as noted by G. O. Smith, is found in Table 3.

Initiation of Control and Period of Application

The proper time to begin application of control over the gas would appear to be at the time the well is first brought in, and this control should be continued until the pressure has declined to a point too low for the gas lift to operate with any acceptable degree of efficiency. The first stages of flowing do not require the introduction of compressed gas since there is usu-

Table 3.—Comparison of Oil-well Gas-control Data

Well No.	Gas per Bbl. Oil, Input, Cu. Ft.	Gas per Bbl. Oil, From Sand Cu. Ft.	Gas per Bbl. Oil, Total, Cu. Ft.	Gas Dissolved in Oil, Cu. Ft. per Bbl.	Gas Abstracted from Oil Not Lifted, to Lift 1 Bbl. Oil, Cu. Ft.	Saving over Natural Ratio of 2850 Cu. Ft. per Bbl. Oil, Cu. Ft.	Oil That Can be Moved to Well by Gas Saved, Bbl.
A		1775	1775	44	1731	1075	0.6
G		2290	2290	39	2251	560	0.25
(Dominguez Hill)	1100	1200	2300	44	1156	1650	1.38
1	222	667	889	44	623	2183	3.27
2	445	377	822	44	333	2473	7.42

Table 2.—Gas-Control Data on Two Wells in Dominguez Hill Field

Well	Production per Day, Bbl.	Gage Pressure, Lb.	Gas per Barrel Consumed, Cu. Ft.	Gas per Barrel Required at 100 per Cent. Efficiency, Cu. Ft.	Efficiency Obtained, Per Cent.	Gas Required to Lift 1 Bbl. at Acceptable Efficiency, Cu. Ft.
A	392	250	1775	143.2	8.1	759
G	741	225	2290	148.2	6.0	823

Fig. 4.—General view of an installation of air lift.

A. I. M. E. TULSA PRODUCTION SYMPOSIUM
OCTOBER 11-12

Theories of Production and Methods of Introducing Gas and Air to Increase Recovery

By L. L. BRUNDRED
*National Supply Company, Houston, Texas**

IN one respect only does the oil business compare with the mining industry. They both have for a definite purpose the production, refining and marketing of natural resources found beneath the surface of the ground. The methods of obtaining this production are so entirely different that the field engineer must, of necessity, be definitely trained to solve the problems confronting the particular industry he hopes to enter.

Of prime importance to both is the subsurface information available. Here the mining engineer, by sinking his shaft and cutting his laterals, is able to examine with the naked eye his productive formations. Not so with the petroleum engineer. At best, he has only the small cores taken at random to furnish information on the measures penetrated.

As we purpose to advance certain theories of oil production, let us first examine what subsurface information is available.

Producing Formations

Roughly speaking, it may be said that our present production is obtained from the following formations, their importance as producing strata occurring in the order named:

1. Sand.
2. Sandy Shale.
3. Porous Lime.
4. Sandy Lime.
5. Crevices in either Sand, Lime or Shale.
6. Oil Bearing Shales.

Nos. 1 and 2, Sand and Sandy Shale, are so closely allied as to be practically one class. They yield by far the bulk of our present daily oil production. Classes 3 and 4, Porous Lime and Sandy Lime, are also closely associated, yielding, for the moment, enormous wells, which soon decline to the pumping class and readily become unprofitable to operate. Class 5, or Crevices, also yield enormous quantities of oil for a few days but decline most rapidly unless fed from some extraneous source. They can hardly be considered as having a lasting economic effect on the industry. Class 6, or Oil Bearing Shales, constitute a study in themselves and are not vital to this discussion. As we are primarily interested in the formations producing most of the oil we shall confine ourselves to a discussion of the Sands and Sandy Shales.

General Stratigraphical Conditions

Prior to the active entrance of geology and to the extensive taking of cores little was known of the character of the productive horizon penetrated. The productive horizon is that formation limited by the so-called cap rock on the top and some general shale bed, similar in extent to the cap rock, on the bottom. This horizon is not all productive as the cores readily disclose. A few graphic sketches of familiar formations encountered in the various producing fields in the United States are given for easy reference.

Sketch A—Sheet Sand

This is the most simple producing formation encountered and represents merely a cross section of a part of many large structures such as the Nowata, Glen Pool, Cushing, Burbank and other fields.

Sketch B—Lenticular Sands

Here is a very familiar formation encountered in nearly all producing areas. From this it will be seen that well No. 1 penetrates three distinct disconnected lenses. Well No. 2 penetrates one large one only. Well No. 3 penetrates two, both of which are also penetrated by Well No. 4 and will be affected by the drainage through No. 4.

Sketch C—Cross Bedded Strata

In this the several producing strata are separated by layers of shale, mica, or other foreign substances tipped at rather sharp angles, causing a perfect seal similar to the lensed condition. From the sketch it will be seen that Well No. 1 penetrates but one stratum whereas No. 2 would be affected by the drilling of No. 3.

Sketch D—Faults

This formation is most familiar in the Balcones Fault Region of Texas and is so well known as to require no discussion.

In passing, we might, however, note that the salt domes of the Texas-Louisiana coast bear a certain similarity to faulted structures in that extreme fractures have taken place, thus trapping off large quantities of oil in the closely confined areas surrounding the salt plugs, and leaving the producing measures so sharply raised, folded, and fractured as to make subsurface study extremely difficult. They therefore must be excluded from this discussion. We must also exclude the larger producing fields of Mexico, as they come under the head of hydraulic fields or those where practically the only force is a hydraulic pressure behind the oil.

Sketch E—An Average Core

In order that we may get a mental picture of fairly average sub-surface conditions, we submit a rough sketch of a core which might readily apply to sand anywhere in the Mid-Continent, Eastern or Western fields, substituting certain changes applicable to the particular field involved.

A minute examination of cores, especially of those taken with a diamond core drill, discloses that there are few, if any, solid bodies of pay sand thicker than ten feet, unbroken by shale, lime, or other breaks, even though these breaks be no thicker than mere pencil seams. These are entirely impervious and form a perfect seal against the vertical travel of oil, gas or water. This is completely borne out by the finding of small gas strata well down in a producing horizon, as well as water strata

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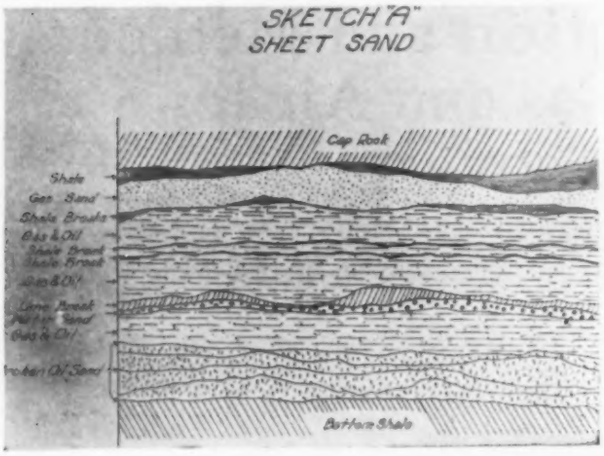
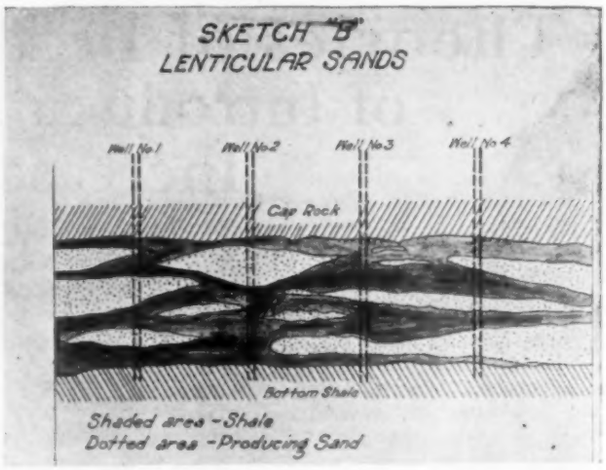
ally consideraby more gas dissolved in a barrel of oil than is necessary to raise a barrel to the surface. After pressure and volume of gas have declined to a point where too much gas is being drawn from distant parts of the sand, a compressor plant should be placed in service to make up the deficiency.

Acknowledgments

Acknowledgment is due to the Roxana Petroleum Corporation, whose progressive policy has enabled this work to be done, and to Reid W. Bond, petroleum engineer assigned by that concern to this work, whose tact and good judgment contributed much toward carrying out the tests to a successful conclusion.





occasionally occasionally accuring near the top.

Such an examination also discloses numerous bodies of barren sands, many strata of richly saturated sands interspersed with those of lean saturation, and many changes in the cementing material holding the grains of sand together.

Fluids Involved

In the virgin field we are dealing with a volatile hydro-carbon under enormous pressure, held in the interstices of the sand by impervious strata against escape to the surface and by capillarity uniformly distributed throughout the particular strata in which that oil is found. Present also somewhere in the horizon is generally to be found a salt water containing at times well known mineral salts.

Condition of Gas and Oil in the Virgin Field

Experience has taught us that the pressure on the sand commonly called rock pressure, is in almost all cases dependent upon the depth of the horizon. The question naturally arises in our minds: "What is the condition of the oil and gas in a virgin field, prior to exploitation?" To obtain an accurate answer to this each field necessarily must be treated separately. In general, however, let us consider the fact that crude oil is made up of a series of volatile hydro-carbons. The heavier fractions, of course, liquefy at normal pressures. Even the lighter fractions will liquefy at at some point. A brief list of the most common gases together with their liquefying pressures follows:

Methane, approximately	..	2000 lbs.
Ethane	"	475 lbs.
Propane	"	100 lbs.
Butane	"	15 lbs.
Pentane	"	0 lbs.

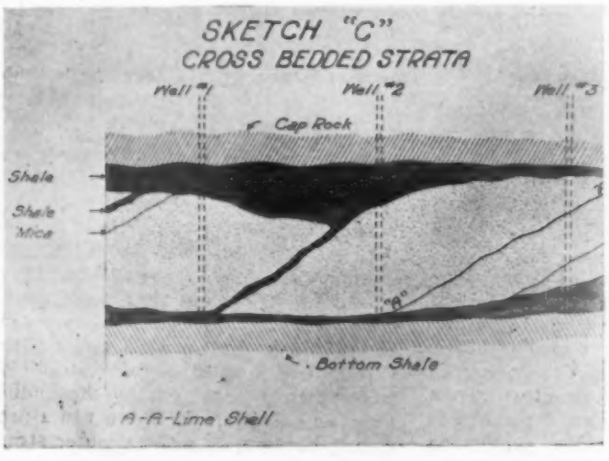
Chemistry tells us that these gases liquefy at these pressures when treated separately, whereas, when treated in conjunction with the heavier gases commonly found in crude oil, the process of liquefaction is hastened and occurs at lower pressure. Actual experience has taught us that these lighter hydro-carbons are produced in larger volume during the initial flush production period of a field than later on, when the rock pressure has been materially reduced. This is due, no doubt, to the more ready vaporization of the lightest fraction when the pressure on the sand is reduced by the open or partially restricted flow of the well.

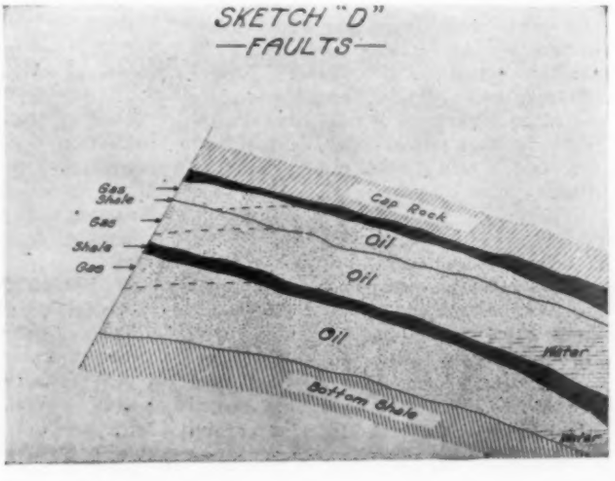
From these assumptions we must deduce the theory that the so-called gas pockets, common to the average oil field, are not in fact pockets of free gas except as to the undissolved Methane. Rather, we must consider that the bulk of the gas produced was originally in a fluid state, vaporized out of the oil by the sharp reduction in pressure caused by the drilling-in of the well.

Theory of Normal Production

We have already noted that the productive horizon is made up of many small producing strata. Vaporization of the oil, being dependent upon such conditions as porosity, saturation, density, gravity of the oil, etc., it follows that this cannot be the same in each stratum, and for that reason it must be understood that all theories advanced are applicable to one stratum only and not to the complete productive horizon.

It is pretty generally conceded by petroleum technologists today that the





most important factor in the production of oil is the gas contained in the reservoir. With this assumption in mind, let us consider Sketch B, selecting for our explanation of the theoretical subsurface action, Well No. 1. Prior to the drilling of this well, the first in the field, the entire area covered by the sketch was virgin territory under high pressure. Partial liberation of this pressure took place when the well was drilled in and started to produce, this reduction in pressure taking place at first in the immediate vicinity of the well, later spreading gradually in all directions as the well was permitted to continue on production. Graphically considered today, many months after the well was brought in the rings "C," "D" and "E" would then represent the "contours" of pressure, "E" being of lower pressure than "D," "D" being lower than "C." So also would the same theories apply to Wells Nos. 2, 3, 4, etc., as each was placed on production.

From this it may be observed that the area of highest pressure and therefore of minimum drainage; that at points "B" the pressure between any two producing wells is at its maximum; and that from this point flow may take place in either direction. Oil and gas starting from point "B," a point of relative high pressure, toward the open well, a point of relative low pressure, must first overcome the resistance of the sand to the travel of this oil and gas through it, in order to finally reach the open hole. Thus we see that there is actually a large differential of pressure required and it is safe to say that in the early life of a field it is this differential in pressure which not only overcomes the sand resistance, but furnishes sufficient additional energy to cause the well to flow. Later, when this differential is materially reduced, it is unable to overcome this sand resistance, the well then becomes profitless to operate, and is abandoned, even though the area drained by it still contains from 80% to 85% of its original oil.

Subsurface Movement

So far we have considered the differential in pressure only in the abstract. Let us now consider the action caused by this differential by consulting Sketch G.

Let us assume for the sake of argument that we are considering one particular barrel of oil under a rock pressure of 150 pounds at point "m" along contour line "D-D" and a 10-pound back pressure on Well No. 1, leaving an actual differential of 140 pounds net. Suppose also that the sand resistance, measured in pounds of pressure, between contour "D-D" and the open well, is but 20 pounds. Under these circumstances oil at point "m" would naturally seek outlet through No. 1 Well.

Now, let us assume that the pressure at point "m" is reduced to 140 pounds. This causes a vaporization of a part of the oil at that point and a minute bubble of gas is formed, surrounded by a film of oil. It starts to travel towards point "n," encountering as it goes, the sieve-like action of the sand which breaks it up, forming numerous other bubbles, each surrounded by its film of oil. These films of oil being under the same pressure as the bubbles themselves are subject to vaporization and as the bubbles travel along toward points "n," "o," "p," vaporization of a part of the film takes place, thus forming many new bubbles, each always surrounded by its own film of oil, until we finally have thousands of little bubbles rushing into the well. In the case of a new well they lighten the weight of the column of fluid and actually furnish the energy necessary to make it flow. As time goes on, the number of bubbles decreases, for the supply is limited, and soon there are not enough to furnish this energy. The well then becomes a pumper, these bubbles bursting and rising to the surface as casing head gas. Later, as the supply of easily vaporized hydro-carbons is depleted, we find our differential in pressure so equally balanced by the sand resistance as to permit of only the most meager travel of oil into the hole. The general result of this condition is abandonment of the well.

Changes in Saturation

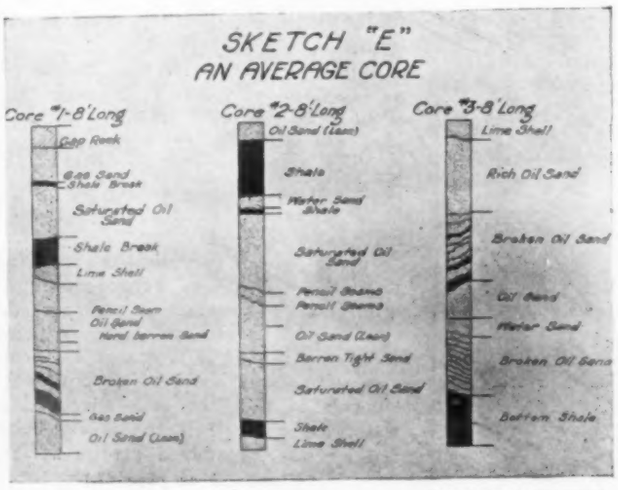
If these hypotheses are correct it readily follows that the oil produced by a flush well does not rush into the hole as a bank or solid wall, similar to the release of a flood of water by the sudded bursting of a dam. On the contrary, we must consider that the entire mass of fluid in any stratum is in constant motion, always moving toward areas of lower pressure, and that no void is left in its wake. Instead, we find this area partially refilled by oil and gas from points of higher rock pressure further back in the sand. This, too, applies to the oil and gas closest to the well, as they are constantly being replaced by other oil and gas coming from behind.

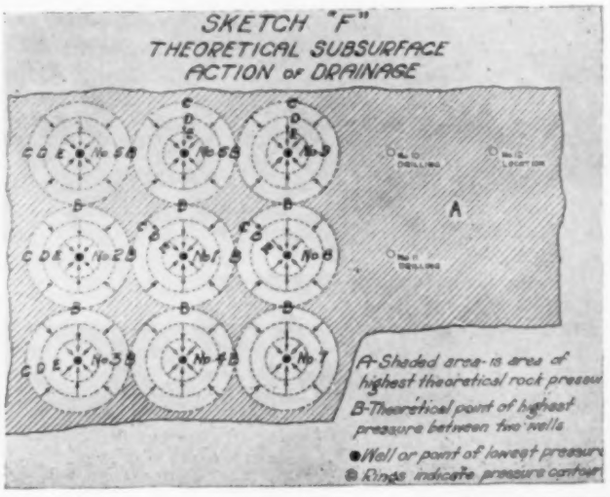
Cores taken in our oldest producing fields have furnished sufficient proof that the saturation in close proximity to some of the oldest wells varies but little from that found in cores taken midway between two old wells and has shown, in almost every instance, a lean but fairly uniform saturation throughout any producing stratum.

Solubility of Gas Into Oil

The question is often asked, "How is it determined that we are producing only 15, 18 or 20% of the oil originally contained in the sand?" This is usually arrived at by a computation based, in general, on porosity, density, saturation, etc. In support of these figures we should consider the solubility of gas into oil.

Recently one of the major produc-




SKETCH "F"
THEORETICAL SUBSURFACE
ACTION OF DRAINAGE
A
A-Shaded area is area of highest theoretical rock pressure
B-Theoretical point of highest pressure between two wells
Well or point of lowest pressure
Rings indicate pressure contour

ing companies conducted an exhaustive test as to the solubility of wet gas, dry gas, and air into a given grade of oil, taking for the experiment, oil and gas directly from one of their flowing wells. A testing apparatus capable of withstanding pressures as high as 3000 pounds per square inch was erected in the laboratory and the results carefully tabulated. Suffice it to say that the general results showed as follows:

(a) That wet gas decidedly soluble in oil.
(b) That dry gas was less coluble.
(c) That air was the least soluble.

Specifically, at 1200 pounds pressure, it was found that approximately 350 cubic feet of wet gas was soluble in this oil, whereas at 150 pounds pressure but 50 cubic feet went into solution.

It had previously been determined in the field that an average of 1750 cubic feet of gas was being utilized in producing each barrel of oil, and it seemed to matter little whether the well considered was flowing or pumping.

Now let us consider a theoretical well producing with a rock pressure of 1200 pounds and let us assume that each barrel of oil contains but 350 cubic feet of wet gas. If we utilize 1750 cubic feet in producing this barrel, of necessity we are wasting 1400 cubic feet. As the only source of this gas is the oil itself, and as all those barrels left in the sand contain but 350 cubic feet each, it will be readily seen that we have actually completely robbed 3.7 barrels of all available gas.

Now, let us consider the same well after the rock pressure has been reduced to 150 pounds. The oil then contains theoretically but 50 cubic feet of wet gas. It must now be apparent that the waste has mounted to 1700 cubic feet. Yet, as the oil left in the sand at this reduced rock pressure contains only 50 cubic feet, it must be noted that this robbing process has rapidly increased, until now we have completely depleted 34 barrels of all available gas. Small wonder it is then that we leave enormous quantities of unrecoverable oil in the sand.

Ratio of Gas to Oil Important

To date only a few of the most progressive companies have paid more than a passing attention to the amount of gas or energy wasted in producing a barrel of oil. Needless to say, the amount of easily vaporized fluid (gas) available in the sand is extremely limited and, if the assumptions given are correct, such waste constitutes ample reason for urging extreme conservation of this vital asset.

Findings

(a) **Examination of Cores.** This discloses that:

1. Few solid bodies of pay sand exist with out breaks.
2. Often water and gas strata are interspersed with saturated oil sands.
3. Lenticular sands are commonly found.
4. Cross Bedded and fractured sands are also commonly found.
5. Cementing material varies greatly in the different strata.
6. Porosity and saturation can be determined with a fair degree of accuracy.
7. Fairly uniform saturation in any given stratum is the rule.
8. There can be little vertical travel of gas, water or oil from one stratum to another.

(b) **Condition of Gas.** The bulk of gas contained in an oil producing reservoir is in a liquid state.

(c) **Productive Energy.** Vaporization of the lighter hydro-carbons furnishes the motive power to produce the oil.

(d) **Solubility of Gas.** Solubility of gas into oil is an established fact.

(e) **Normal Recovery.** Only inefficient recovery can be expected from present producing methods and waste of gas must be prevented.

Theory of Methods of Introduction of Gas or Air to Increase Normal Recovery

The general fundamental scheme of this method of operation is to rebuild the rock pressure, already seriously depleted by the escape or waste of gas and partial removal of oil. In actual operation gas or air is pumped into an old producing well or into one drilled for the purpose.

Returning to Sketch F we may observe the theoretical subsurface action resulting from the injection of this gas. As soon as the gas is pumped in all flow gas and oil from the sand into the well is stopped, gradually the action is reversed ,and the pressure contours change places. Contour "E" then becomes the highest, "D" the next highest, and "C" remains momentarily the same. Continued injection of the gas gradually raises all of these pressure contours until all flow takes place toward the open or surrounding wells.

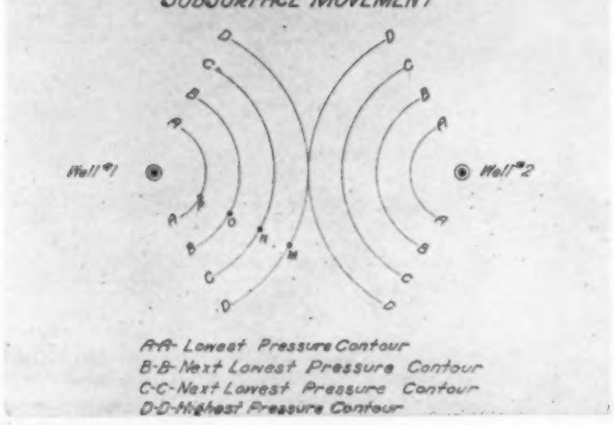
We have seen that gas and air are both soluble in oil. Pumped into the sand as just described, a maximum amount of such gas naturally comes into direct contact with a maximum amount of oil. As we have seen, this oil already has been largely depleted of its lighter vapors. Naturally, absorption takes place rapidly, as the very separation of the particles of oil by the grains of sand permits of maximum exposure to the incoming gas.

The solubility of gas into oil being largely dependent upon pressure and being materially aided by agitation, is there any wonder then that this gas being pumped into an oil sand under relative high pressure, vainly seeking its way out, spreading first in this direction ,then in that, is a fit subject for absorption into the oil left in the sand?

Returning to Sketch F: The original contour of highest pressure "C," is now at the well itself. Our new contours of pressure, representing a gradual reduction in pressure, now radiate from this as a center, spreading in all directions until the offset wells are finally reached.

In the case of the original producing well these contours represented the differential in pressure in the area surrounding the well, this pressure being reduced daily as it was not fed from any extraneous source. In contradistinction to this, the area surrounding the injection well is constantly being fed by gas introduced at the surface

(Continued on page 67.)



A. I. M. E. TULSA PRODUCTION SYMPOSIUM
OCTOBER 11-12

Increasing Recovery and Its Economic Effects

By H. C. O. CLARKE and H. J. LOWE

THE subject is so broad in its scope that it is obviously an impossibility in the time allotted to more than touch upon a few of the important steps which are now coming into the industry to increase recovery. The development of present methods has been a gradual outgrowth of accumulated observation, both scientific and practical, of conditions surrounding the accumulation and extraction of oil bodies. Until comparatively recently, our knowledge of many of these factors had hardly gone beyond the experimental stage. We are now well into the transitional period between the experimental and practical, and it appears certain that the use of gas, air, water drives, possibly the mining process and improvement of operating equipment have been developed to a point where their commercial application on a large scale will bring satisfactory results, having a wide and lasting effect upon the oil industry throughout the world. Because of its comparative newness and its appeal to the imagination, the restoration of rock pressures is more in the public eye than are many routine production processes and methods that may be of equal or greater aggregate importance and which must be extended and further improved to keep pace with the times. It is therefore proposed to briefly touch up the more important of these factors and their possibilities in their respective orders. Inasmuch as we are now concerned with the salvaging of oil in developed pools, no consideration will be given to new properties.

Maximum Not Obtained

In many of the so-called "hydrostatic" or natural water drive pools, the existing well spacing is such that it is highly probable that maximum recoveries under present methods, are not being obtained. Large quantities of water carrying comparatively small amounts of oil, handled with present lifting methods, bring such limited returns that additional expenditures in new wells and equipment apparently cannot now be justified from a ledger standpoint. It is reasonable to suppose that coning has taken place in many wells of this character and particularly so in wells, which may have bottom water difficulties. In many cases, the sands may be water logged. This has undoubtedly curtailed production in many instances but the measure of the wells under these conditions should not be necessarily accepted as a measure of the productive possibilities of the sands. I am sure that many of us can cite specific instances of profitable late close drilling in water flooded areas and also have in mind cases that might justify additional drilling.

Certain more or less standardized methods of stimulating individual wells on old leases have long been in use. These constitute for the most part cleaning out, deepening, shooting, paraffine removal and repairing casing in old wells. Often this work has proved futile because it was done in a haphazard manner without knowing the actual conditions of the well. Today, more attention is being paid to subsurface conditions and clearing out and re-working jobs are based on the conditions of each well after careful study.

Value of Water Control

The elimination and control of water in wells is one of the first questions to arise on most properties. There are undobtedly many instances where the presence of water has been of direct benefit but off-setting this is the every day problem of preventing the destruction of improperly drilled properties due to improper water control. Careful water sampling, casing and shutting off tests should be, and are in many cases, routine matters. Greater emphasis should be laid upon source determination. Casing leaks or bottom hole jobs should be given immediate and careful attention. Stage plugging for reducing edge and bottom water, when based on sub-surface studies, will greatly assist in reducing lifting costs.

A second item of importance in the production of old properties is the efficient and economical handling of the large volume of fluid. The development of heavy pumping equipment has greatly facilitated this problme in hydrostatic fields, and particularly so, on properties not suited for the air or gas lift. The hydraulic pump and other pumps of the long stroke variety—some of which have a stroke of fifteen feet—offer a practical solution of the pumping problem, and will undoubtedly result in the recovery of large quantities of oil that would otherwise be left permanently underground; also, the use of counter balanced direct connected pumping units and kindred devices should materially increase the ultimate recovery from many properties, besides reducing lifting costs.

The control of loose sands is of vital importance in many fields and constitutes one of the mose serious problems, as the cost of replacing cut out equipment and the shut down time incident to the presence of sand pay may readily mean the difference between profit and loss on a lease. The use of the steel plunger pump, combined with cups, as a pumping medium has long been in use and is perhaps the most generally efficient method now known. Other types of pumps, including one with a circulating device, have been used with more or less satisfactory results, but to date, no really satisfactory method has been devised to handle this important problem. The matter of resetting and washing screens is a routine process that frequently fails to bring the results hoped for the very good reason that the mechanics for combatting the in-flow of very fine sands has not reached perfection.

The paraffine problem is a major item of production expense in numerous areas. The removal of this wax is often a real problem and has been the subject of much profitable study and investigations. Following the use of various ordinary and generally unsatisfactory mechanical cleaning and reaming edvices, the uses of steam, cold and hot solvents and of various types of heaters, have been developed and placed into practical use. The success had with these methods has been variable as has their cost, but their use has been generally beneficial and offers great possibilities. It is certain that the deposition of paraffine on the sand faces of wells is a material cause for decreased production and that a maximum production cannot be had until it is removed, which frequently cannot be satisfactorily accomplished. This constitutes a major field for future investigative work.

Maintaining Back Pressures

The maintenance of back presssures or "pressure control" on wells is a matter of increasing interest. We know that in a great many fields, the release of the dissolved gases held in the oil by underground pressures has been the major propulsive medium causing wells to flow. Experiments carried on by the Bureau of Mines and others clearly indicate a close relationship between gases held in solution under pressure and viscosity. That is: viscosity, up to a certain point, is more or less controlled by the amount of gas dissolved in the oil, and under av-

erage conditions, it would appear that the quantity of oil that will normally flow through the sand interstices is inversely proportional to the viscosity of the passing oil. By maintaining, if possible, a reasonable gas-barrel ratio, the flowing life of wells might be materially lengthened and ultimate recoveries increased in many instances, over those obtainable by unrestricted flow conditions. On the other hand, there may also be conditions where an unrestricted flow, regardless of gas-barrel ratio, would result in greater recoveries at less cost, than with the pressure control method. It is probable that the maintenance of back pressures may act to retard "coning" in fields, such as Powell, and thus have a favorable effect upon aggregate recoveries. These, however, are factors for which no rule may be set down and which are open questions in the minds of competent engineers.

Methods to Stimulate Flow

Thus far, our discussion has had to do with work confined to individual wells and to the production of oil after it has flowed into the well cavity. The apparent inefficiency of these methods of extraction, which has made possible a recovery, estimated at not over fifteen to twenty-five per cent of the oil content of the reservoir body, has led producers to interest themselves in finding methods to stimulate the flow of oil into the wells themselves. Three general methods of such stimulation or introduction of artificial pressure have been developed, namely: the application of vacuum; the application of compressed air or gas; and, thirdly, the water drive, with or without the use of chemicals. A fourth process has to do with mining, which may incorporate any one or all of the first three processes in connection with tunneling operations.

The application of vacuum has long been in general use, but it appears to be a question if its application, when considered from all angles, has produced what was expected of it. There is no doubt but that its use has resulted in increased gas and gasoline recoveries, but it appears doubtful, if, as an oil producing agent, it has been generally profitable. The use of this production agency, which has been largely confined to the Eastern and Mid-Continent fields, involves a very material expense in plant installation and up-keep costs. Its discontinuance, even for short periods of time, often has a very deletrious effect on wells to which it is applied as when the vacuum is released air flows into the well, pressures are equalized and oil is driven from, rather than into the well. Pressures, obtainable through its use, are not comparable with what may be procured by the air, gas or water drive processes, and it therefore follows that a larger recovery should be effected through the use of these latter agencies.

An increase in the differential pressure between an oil sand and an oil well may be obtained in two ways; either by the use of vacuum or by increasing the differential from within the oil sand, itself, by the use of compressed air, gases or water. Compressed air was first successfully so used in the fields of southeastern Ohio and West Virginia some twelve or fiftee nyears ago, through the medium of the Smith-Dunn or Marietta process. The theory, governing the use of this process, is well known and constitutes the restoration, in part, of the pressures originally in the sand through the injection of air under pressure into selected wells. Its use has been largely confined to shallow gas driven fields although it is being introduced into deeper sands in scattered localities with appreciable results. It does not appear that this system or a system using gas as a pressure medium can be successfully used in natural hydrostatic driven fields although it may have some practical use in retaining pressure in fields of this character before they are entirely taken by water. As far as known, this application has not been made in depleted areas productive under straight hydraulic pressure where large amounts of water are present.

Air and Gas Drives

During the past three or four years, the use of the air or gas drive has become widespread in the depleted shallow fields in northeastern Oklahoma with very satisfactory results. Production on numerous properties has increased from two to five fold and in selected areas, its adoption is almost certain to bring satisfactory results. The success of the system is largely dependent upon a unit, or modified unit plan of operation, as it is generally impracticable to apply the drive on small scattered leases on a structure. No set rule for its application can be established and each property, together with each well on it, must be handled in an experimental manner until the proper injection pressures have been determined.

The system may be used in combination with vacuum on the producing wells. This has been the customary practice in many of the Oklahoma districts where vacuum was in use prior to the introduction of the drive. However, after the introduceion of the drive, vacuum is frequently discontinued on all save line wells where it is maintained to protect property lines.

In considering the use of the air or gas drive, the question naturally arises as to what aggregate effect on production would result if it were generally applied, not only in depleted, but in partially depleted areas as well. Assuming the use of this method of pressure restoration to be applicable to gas driven fields alone, it would appear that its scope is limited to areas producing not in excess of twenty per cent of today's average daily output of crude, or roughly, 440,000 barrels. Assuming that present production methods obtain but fifteen to twenty per cent of the oil content of a sand and that the use of this recovery agent could make possible the recovery of an additional fifteen to thirty per cent, we can, in the light of the present production obtained from areas where its application appears possible, obtain an idea of what may be anticipated from the air or gas drive. We should, however, in considering the above appreciate that this form of drive does not have a general application, and that in numerous fields, its use may not be worth while from a production standpoint. We must also appreciate that, although the process has been in use for a number of years, we really have very little concrete knowledge beyond application principles. The drive may do much more than we now hope for it, or, on the other hand, the aggregate results may be disappointing. At any rate, this system, as well as the water drive with variations, offer greater possibilities than any individual methods of increasaing recovery above normal declines that have yet been advanced.

The water drive, like the gas drive, has been in use for sometime, although its application has been entirely confined to the Bradford district, where the requirements for its successful application seem to be ideally present, and where very favorable results have been obtained. The general use of this method, that is, the actual introduction of water into selected wells for the purpose of flooding, may probably never be generally used because of the natural physical conditions perrequisite to its successful operation. It may be successfully used following the gas drive in selected areas. There is a strong probability, however, that the use of soda ash, or other chemicals whose purpose is to reduce surface tension, may be developed to such an extent that they may be generally applied in hydrostatic head fields by introduction into edge wells. The use of soda ash in fields carrying brine solutions has been questioned but if soda ash cannot be applied under these conditions, other chemicals will be found that will work. We thus find that although the directly applied water drive may not be generally used, the adoption of a modification of the

(Continued on page 67.)

A. I. M. E. TULSA PRODUCTION SYMPOSIUM
OCTOBER 11-12

Application of Pressure to Elliott Pool, Nowata County, Oklahoma

By J. E. ROTH
*Petroleum Engineer, Tidal Oil Company, Tulsa**

BECAUSE of the great vogue the pressure application to oil sands is undergoing now, it is interesting to follow the history of the first major air installation in the Mid-Continent field.

In the spring of 1924 when this plant was built there were no successful air plants operating in Oklahoma, although three small gas drives were making a success. In Texas it had not been tried at all and so far as we know there were only five successful plants in Kansas. There were twelve failure in Kansas in the Chanute area at this time.

Now just two years later, one finds upward to eighty plants operating or building in Oklahoma. In Kansas there are 22 successful plants, seven failures (not mentioning the abandoned plants near Chanute) and six building, while Texas has entered the race and now boasts of ten operating plants.

History of the Elliott Pool Up to the Time of Air Installation

The Elliott Pool of some 605 productive acres of Bartlesville sand, lies mainly in Section 3, Twp. 27, R. 15 E. This is four miles west of the village of Lenapah on the Nowata-Coffeyville road and lies just north of the Delaware extension of the Nowata field.

From the available records the discovery well was brought in during October, 1909, with an initial production of 275 barrels per day. The pool was drilled up during the fall of 1910 and the spring of 1911. During this time 111 wells were drilled, averaging about 250 barrels per day, initial production. There was a good uniform gas pressure over the pool and some of the wells flowed.

In 1913 vacuum was applied and was probably successful as it was continued until July 22, 1924, when air broke through into two wells causing the vacuum pumps to go down. They were never used after that date.

Now, at the start of 1924, we find 82 producing wells averaging about .53 barrels per day. It might be well to show right here how close to the economic limit of exhaustion this property had come. From a perusal of the available logs we find an everage sand thickness of 38.8 feet, divided as follows: gas sand 15 feet, oil sand 20 feet, unproductive sand 3.8 feet. These same logs indicate that there is no water in the sand and that the gas is uniformly spread through the pool.

By drawing a line around the pool through the outside wells and figuring the area contained we determined that there are about 605 productive acres. Then 605 x 20 feet of oil sand gives us 12,100 acre feet of pay sand.

Using Mr. A. E. Melcher's figures of 16.1 and 16.6 per cent porosity from two samples of Bartlesville sand, taken a few miles west of here, we will assume a porosity of 16 per cent for the pool. Considering also that this 20 feet of sand as completely saturated we get

12,100 acre ft. x 43,560 sq. ft. / acre x .16
5,6175 bbls. / cu. ft.

which equals approximately 15,000,000 barrels of oil.

We have actual gross production figures for the four years from 1919 to 1923, and by constructing a decline curve on a well basis upon log paper in the reverse direction we find that about 1,700,000 barbarrels or 11.3 per cent of the original content has been produced.

Following is shown a decline curve for the pool, transposed from log paper, which goes back to 1912. It could not be worked back of that date due to changes in the number of producing wells.

Now continuing the curve the other way, we find that only 135,000 barrels or .9 per cent of the original content of the pool will be produced from 1924 to 1934. This would seem to indicate that as far as ultimate production is concerned that the Elliott pool has just about reached its limit and something had to be done to rejuvenate this production. In this case pressure was tried and its effects will now be studied.

Installation and Application of Pressure

Two 110 H.P. direct driven Watts Miller Improved Gas engines which delivered about 800,000 cubic feet per day to the sand, were originally put in the plant. They soon proved inadequate and a third engine of the same type was added in January, 1925.

This installation is about the same as is used in compression casinghead gasoline plants. The old vacuum lines were used as a gathering system for the returning casinghead gas and a new system of lines was constructed to carry the air-gas to the pressure wells.

At the plant the gas not required for fuel is brought around to the compressors where its deficiency in volume is made up with air and the resulting mixture compressed and sent to the field. There was one line explosion at the plant during an electrical storm in 1924 which indicates the danger of air-gas mixtures. We have here 42 per cent of gas and 58 per cent of air in our air lines now, which seems to be above the burning range. The danger of these mixtures and the precautions used will be discussed later.

The air wells have rag packers run in on the tubing and cemented just above the sand as is described by Mr. J. O. Lewis in Bulletin 148, U. S. Bureau of Mines. They are selected after a study of well and underground conditions so as to get maximum effects from the fewest wells. We will consider the efficient spacing of air wells later in this paper.

The engines were started up June 26, 1924, and on July 12, 1924, continuous operation was begun with air under 180 pounds pressure going into six wells, called "air" wells. On July 21,1924, air broke through into two oil wells and the three vacuum pumps were shut down.

With the shut down of the vacuum system production went all to pieces, falling to only seven per cent of the production before air. All but four of the wells stopped pumping for at least a few days, but gradually as the air drive reached them, they came back. There were several edge wells, however, that did not pump a drop for over a year.

From August 15th on through the fall of 1924 and all of 1925, production steadily increased until we had an increase of from three to four hundred per cent. During 1926 there has been little change due to low pressures caused by down time for reworking the engines and an increased volume going into the air wells.

It is interesting to watch the spread of air and notice its influence upon production. At Lenapah all oil wells are tested monthly for increased pumping time, increased casinghead gas volumes and air percentages. The air wells are also tested so we know which ones are taking the most air and really affecting a big area. These tests are of great value in securing efficient air operation as any sudden increase in volume of both an air well and a nearby oil well is noticed and steps for the prevention of blowing through, or bypassing, are immediately taken. At Lenapah we have been fortunate and have had no serious trouble with blowing through.

Factors Affecting Efficient Operation

Location of Air Wells

Earlier in this paper we mentioned how air wells are made and now we will discuss locating them. Only six wells were used at first and the rest were added from time to time in places where a study of

*Paper presented before the Tulsa meeting of the Petroleum Division of the A. I. M. E.
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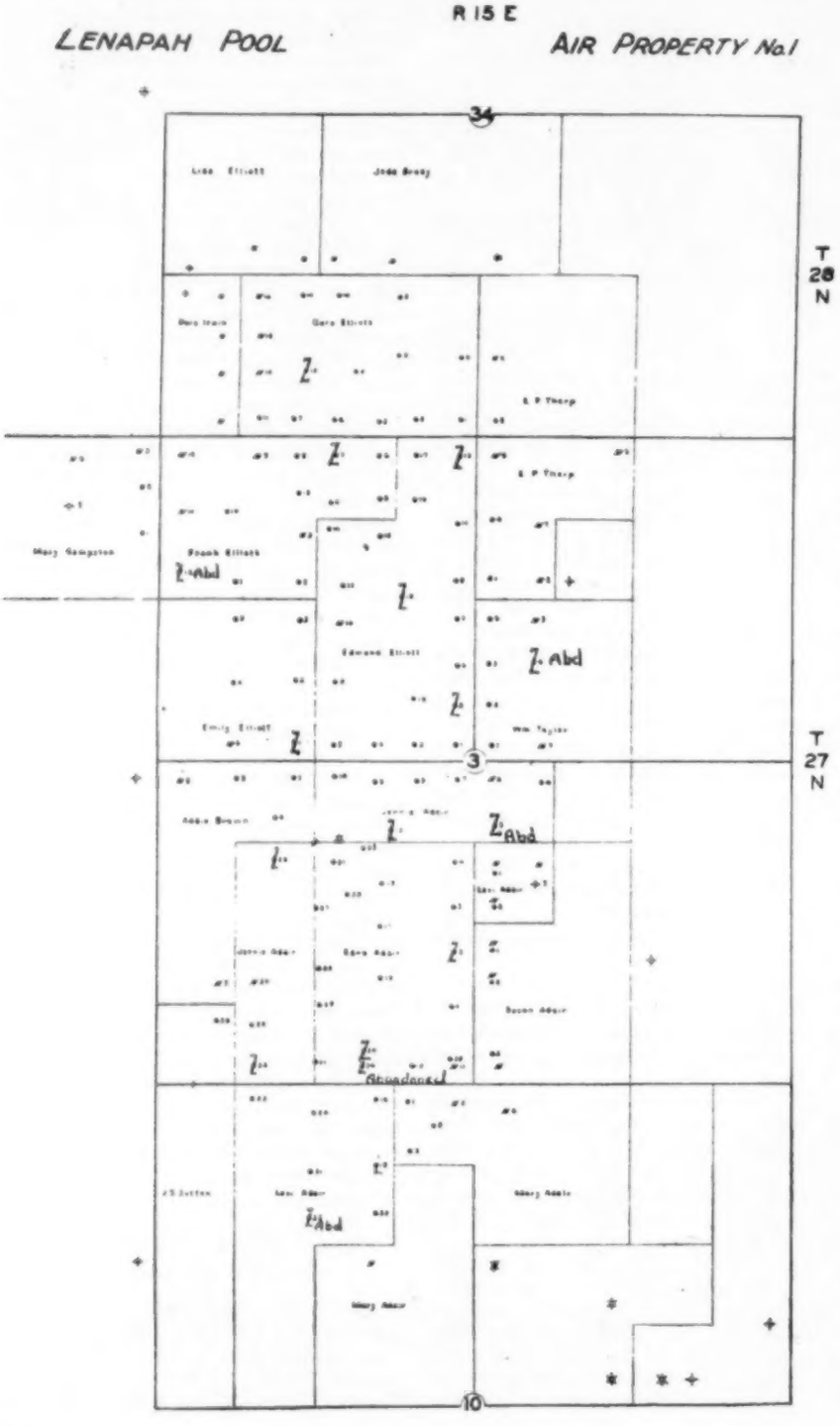
conditions showed that they were most needed.

Of the six original pressure wells, four have been abandoned due to various conditions. Two air wells were located along the east side of the pool and were expected to drive the oil in from that side of the pool. However, they are in a broken formation and would not take air at the pressures obtained at this plant so have been disconnected.

No. 34 Edna Adair, near the plant, did some good originally, but water commenced leaking into it and drowned it out. It was considered cheaper to drill an air well beside it rather than to drill it out and fix it. This new well is affecting a large area.

On the south end of the pool we had a good air well taking over 100,000 cubic feet of air per day. This volume, however, did not affect nearby wells so probably it was going off into the old abandoned gas field to the south. For this reason the well was abandoned and another well northwest of it was used to replace it. This new well has made several edge wells produce that had not pumped for over a year.

The wells picked later, after the trend of the air travel had been established, were uniformly successful and have ensured an even spread of air over the pool.



Oil-Gas Ratios

The ratio of the amount of gas per barrel of oil produced is an interesting indicator of the efficiency of air plant operation.

In the following table we show these ratios for two leases, one the Edmond Elliott Lease situated in the center of the pool, the other the Dora Elliott Lease located on the north edge.

Before the Installation of Air

Year	Barrels of oil	Cubic Feet of Gas Edmond Elliott	Dora Elliott	Av.
1918	1	2025	4750	3340
1919	1	2420	4280	3350
1920	1	3175	4220	3700
1921	1	2522	7000	4760
1922	1	2235	5450	3840
1923	1	2485	3350	2925
1924*	1	....	....	2370

*May, 1924.

After Pressure Application for One Year

1925†	1	....	....	3390
1926‡	1	....	....	3640

†Last six months 1925.
‡First six months 1926.

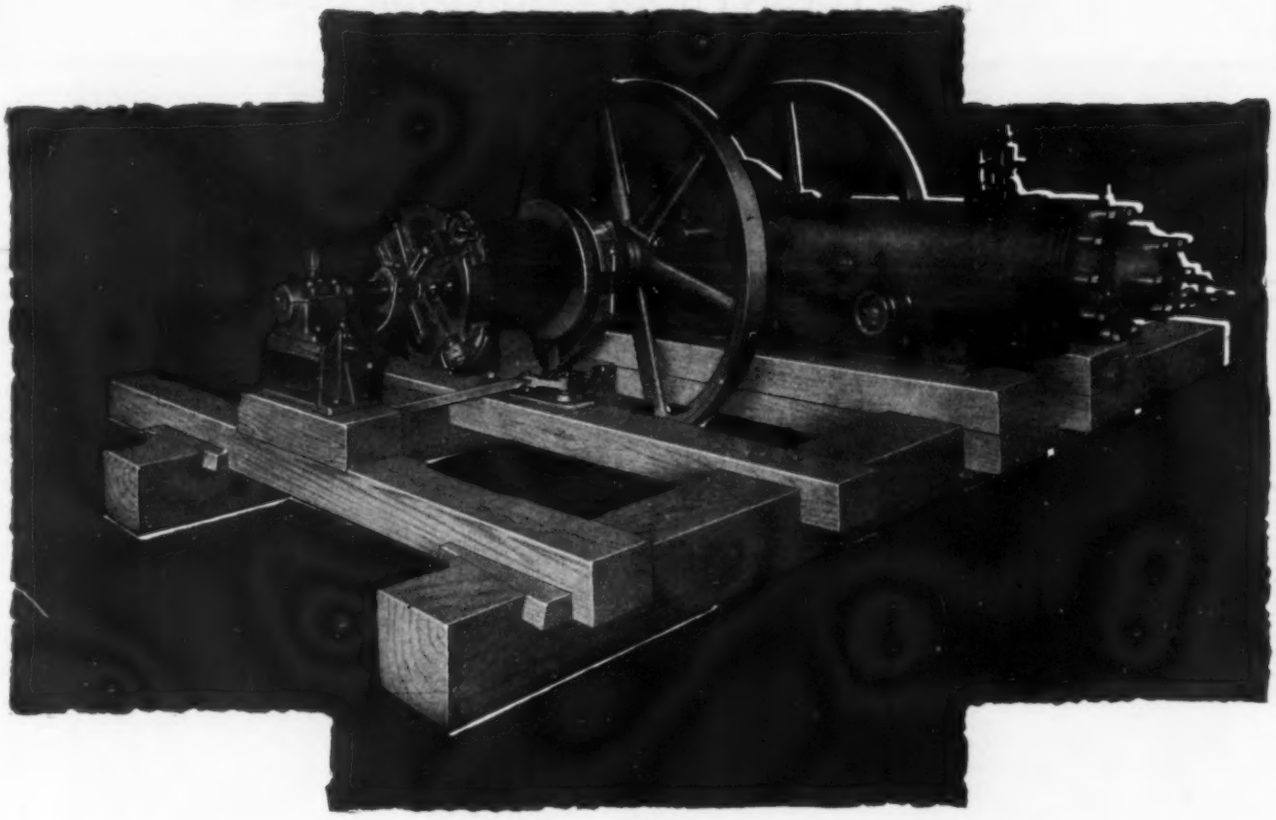
From the May, 1924, figures taken on the pool as a whole it can be seen that our operation has been efficient so far. Any sudden marked increase in the volume, per barrel, would show lost efficiency and indicate bypassing, for then the air would not be bringing out its quota of oil. As the sand is depleted the volume per barrel will continue to rise and by watching it we will have an indication of when our air application has about reached the economic limit of usefulness.

Casinghead Gasoline in Connection With Air Plants

The status of gasoline plants in old depleted fields has caused much worry on the part of their owners. The gas from this pool was used by a gasoline plant and the shutdown of the vacuum plants cut off this supply, seriously affecting the life of the plant.

In May, 1924, the pool average 164,000 cubic feet per day, testing 4.69 gallons per 1,000 cubic feet or 605 gallons per day. A few weeks after air was introduced the volume showed a big increase but the air-gas mixture tested only .28 gallons per 1,000 cubic feet. This value gradually increased until November 19, 1925, the mixture tested 1.28 gallons per 1,000 cubic feet with a volume of 545,000 cubic feet per day, containing 690 gallons of gasoline.

The presence of these vapors in the gas caused considerable trouble in cold weather, in filling all low places with fluid. To eradicate this trouble we constructed a set of coils and placed them with a



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scrubber tank in the high pressure system. This apparatus was put into use in January, 1926, and made 200-250 gallons of gasoline per day with a pressure of only 135 pounds. These coils were placed to give the best air plant efficiency, their efficiency as part of a gasoline plant was not considered in this case. However, this summer, even during the hot weather we were able to obtain from 50 to 60 gallons per day.

Another thing to offset the loss of gasoline revenue has been a 2 degree A. P. I. increase in gravity which, along with increased production and the gasoline now made, has more than made up for the loss of revenue from old gasoline plant. Considering that gravity is increased and that a considerable portion of the gasoline can still be obtained and that with increased efficiency of operation in the future, this revenue will probably be still more increased, it would seem that giving over part, or all, of many little gasoline plants to pressure application may be a profitable thing for their owners.

The Danger of Using Air-Gas Mixtures and its Remedies

There has been no recurrence of the explosion of October, 1924, which destroyed 400 feet of two-inch line, but measures were taken to minimize the danger of explosions and to cut down damages if they should occur. Immediately after the explosion, apparatus for collecting and cooling the exhaust gases of the engines, which amounted to about 500,000 cubic feet per day was installed and this gas added to the incoming gas to give a non-explosive mixture.

With the installation of so called lightning arrestors which were points of casing filled with steel shavings, operating on the Davies Safety Lamp principle, the exhaust gas system was abandoned. However, as there have been explosions at other plants having these arrestors on the lines, they seem of doubtful value in case of violent explosions. Slow burning flames are slowed down apparently by these screens but do burn through them and go down the line. Incidentally, stone or brass should be used in these in place of steel, as iron, due to the possibility of iron sulphide being found which might, in the presence of the proper elements, act as a catylitic agent starting a flame itself.

At this plant we rely mainly upon having a safe mixture in our lines for protection against explosions. The air-gas mixture going to the wells now contains 42 per cent gas, which would be almost impossible to ignite.

The best solution seems to be in separating the air and the gas, letting part of your compressors pump gas and the rest of them air. This might cut down your plant efficiency, at times, due to fluctuations in volume but it would be much safer.

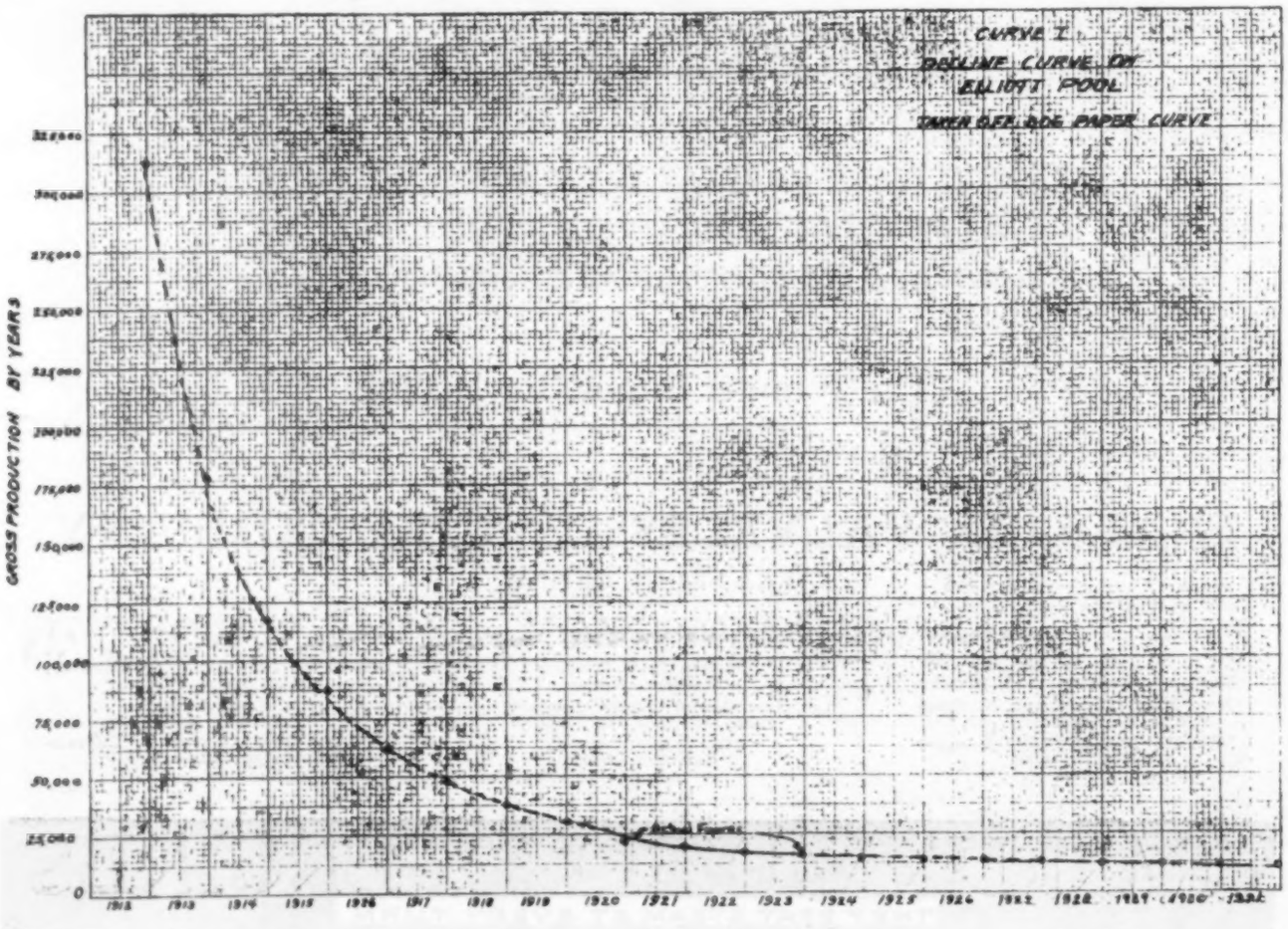
The Operating Cost and How It is Affected by an Air Installation

In considering an air plant installation the changes in operating costs due to air are of great interest. The addition in investment with added equipment would indicate a greatly increased operating cost which, however, is not the case in an efficient plant.

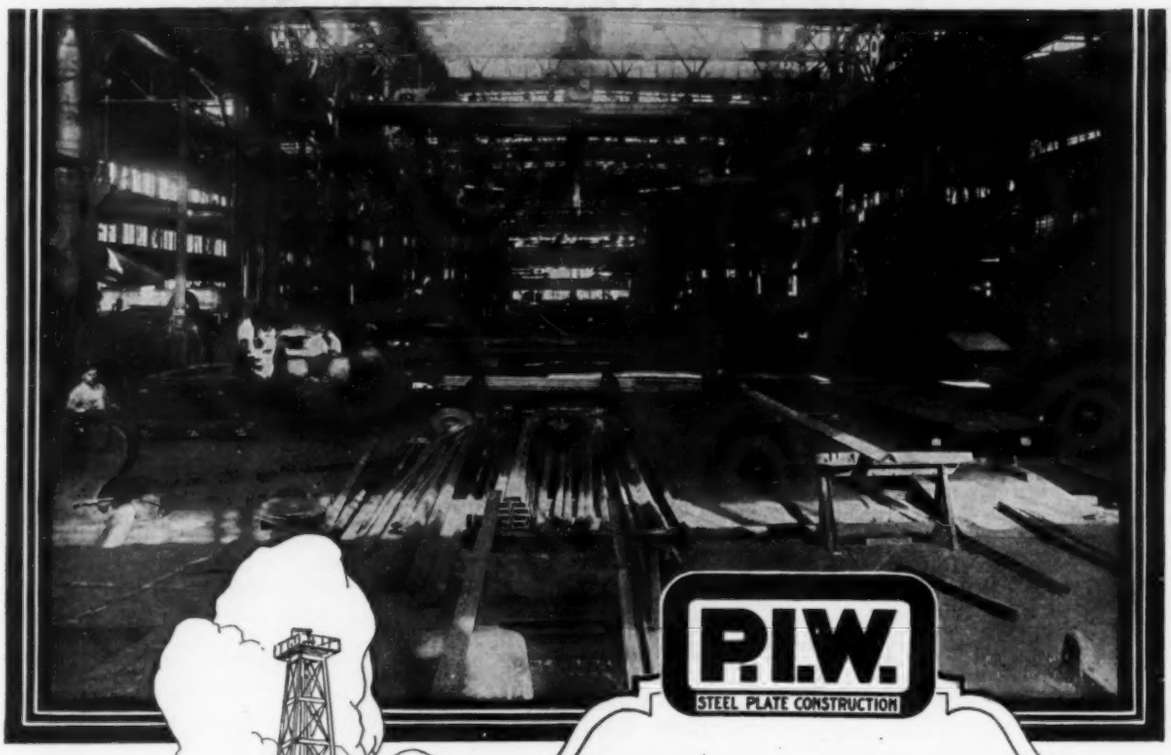
To begin with, the increased production, per well, tends to lower costs, per barrel, and offset the increased total cost. Then in this case it has been found satisfactory to pump only three times a week, permitting pumpers to double up on leases and making it possible to pump the property with less men than ever before. The air forces the oil into the well, so that it doesn't matter whether it heads up or not, for just as much oil can be obtained every other day as from daily pumping.

We require only one man to operate the plant, which operates twenty-four hours per day. No night man is used as the operator lives near the plant and with the aid of automatic shutdowns keeps the plant going. The plant operator also farm bosses the property. The same number of routabouts is used as formerly so there has been practically no change in payroll expense. The only big item of in-

(Continued on page 67)



The P.I.W. PLANT



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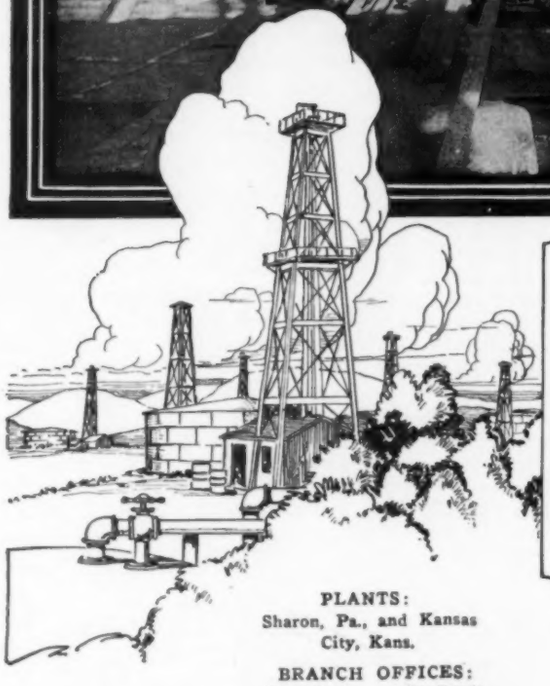

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Powell's Ultimate Yield Increased by Plugging Back Methods

Abstract of paper prepared for the Tulsa meeting of the Petroleum Division of the A. I. M. E.

By H. B. HILL and CHASE E. SUTTON
Petroleum Engineers, The Bureau of Mines

RESULTS of experimental work in plugging back bottom water and other engineering work in the Powell, Texas, field were given in a paper prepared by Messrs H. B. Hill and Chase E. Sutton, of the Dallas office, U. S. Bureau of Mines, at the recent Tulsa meeting of the Petroleum Division American Institute of Mining and Metallurgical Engineers. Due to its length and the number of illustrations and charts, the paper is not reproduced in full. Its chief points are given, however, in the brief which follows:

The outstanding features in the development of the Powell field are: (1) Rapidity of development; (2) close spacing of wells; (3) high initial yield of wells; (4) high peak production of field; (5) sharp decline; and (6) early and rapid encroachment of water.

The nature of the field is also of special interest in that the Woodbine production is found at an average depth of approximately 3000 feet in a comparatively narrow strip, approximately 7¾ miles long with an average width of half a mile, or probably ten locations wide. The surface elevations vary from 300 to 400 feet above sea level.

The oil is trapped between the fault on the west side, edge water on the east, north and south, and a bottom water of high head and large volume on the high part of the structure. To recover this oil is a problem of great interest and importance in the development and operation of this type of field.

The total proven productive acreage of the Powell field is estimated at 2600 acres.

The ultimate production from the field is estimated at 108,760,000 barrels. This gives an ultimate production of about 41,800 barrels per acre. The past production to May 1, 1926, is 83,866,000 barrels, or a recovery to that date of approximately 32,300 barrels per acre.

The total sand volume of the reservoir is estimated at 5,099,000,000 cubic feet, with an average sand thickness over the entire field of 45 feet ,and an ultimate recovery per acre foot of sand penetration of 930 barrels.

The recovery per acre foot of sand thickness to May 1, 1926, is 718 barrels.

Due to the large quantities of water handled in the Powell field during the early part of 1926 (approximately five barrels water for each barrel oil), the production cost per harrel of oil is high and figures applicable to other fields are low for Powell. The average production cost per barrel of oil varies from 28 to 87 cents, with an average of 49 cents, for five companies. Based on these figures, the average lifting cost per barrel of fluid was eight cents; or in other words, when a well or property is producing 25 barrels of fluid to recover one barrel of oil, it is barely breaking even and is below the economic limit.

Results of engineering work to secure subsurface information are summarized as follows: (1) Original oil-water contact; (2) sand conditions; (3) water encroachment; and (4) plugging operations.

It is believed that the wells having a high initial production and allowed to flow unrestricted, which were completed above and in the vicinity of the oil-water contact line, had a tendency to "pull in" the water from below and thereby started a coning effect which has possibly resulted in trapping considerable amounts of oil. Also that the height and diameter of

Kevin-Sunburst Extension

Great Falls, Mont.—Large Standard and independent companies have begun a series of tests in the southern extension of the Kevin-Sunburst field. A large flow of gas was recently tapped and this is regarded as an indication that another pool may lie underneath the main gas head. The California Petroleum Company, Carter Oil Company and Gypsy Oil Company are the leaders in the movement. The Carter interests alone will drill six wells in the region. Smaller companies will drill one and two wells each.

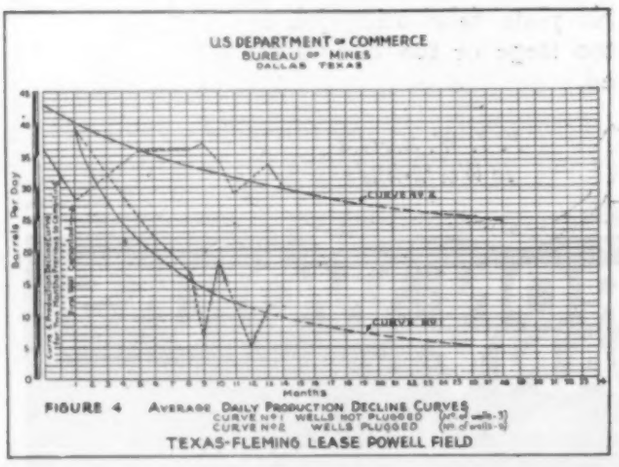


FIGURE 4 AVERAGE DAILY PRODUCTION DECLINE CURVES
CURVE NO 1 WELLS NOT PLUGGED (part of wells-1)
CURVE NO 2 WELLS PLUGGED (on of wells-1)
TEXAS-FLEMING LEASE POWELL FIELD

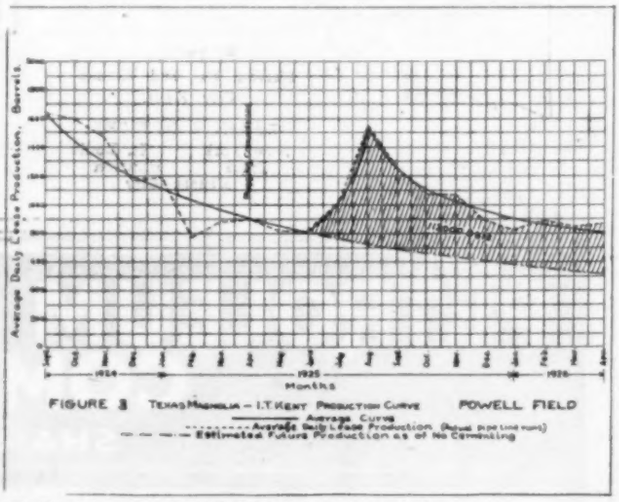
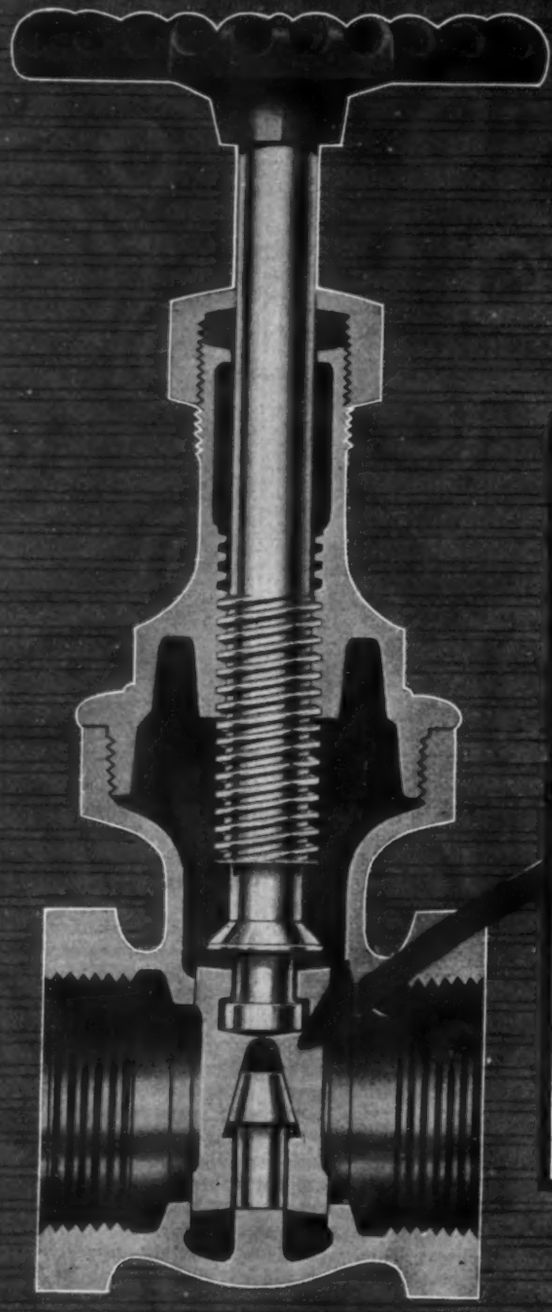


FIGURE 3 TEXAS-MAGNOLIA – I.T. KENT PRODUCTION CURVE POWELL FIELD
Average Curve
Average Daily Lease Production (Figure not final run)
Estimated Future Production as of No Cementing

Charts taken from the report by H. B. Hill and Chase E. Sutton on the Powell field that show typical results from plugging back bottom water at Powell.

OPERATING METHOD REDUCES WEAR



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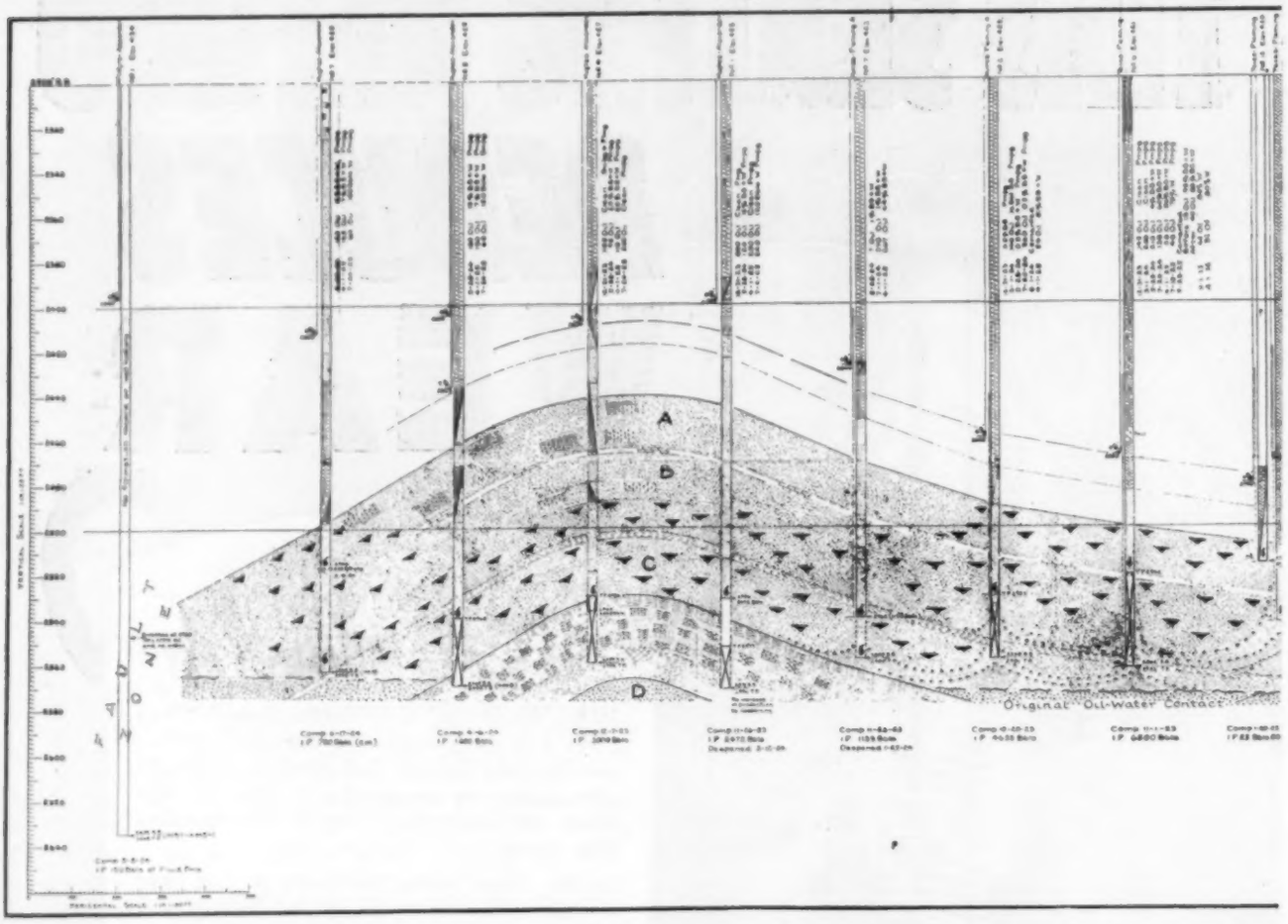


the cone depend largely on the initial production, depth completed above water table, and well spacing. In other words, every large well completed under these conditions was conducive to coning, and that close spacing and rapid development favored a number of small cones, rather than larger, obtained when the well had a more distant spacing. Close spacing, no doubt offers a better opportunity for a more complete drainage of sands and less loss of oil by the trapping between the outer limits of the cones.

The slightly inclined water plane and the low dip of the pay sand are natural factors that have, no doubt, influenced the sudden appearance of water over large areas, and probably account for the unusual uniformity of depth below sea level to which the major portion of the wells were drilled throughout the entire field.

It is noticed that as a rule wells penetrating the sand on the high part of the structure away from the water have logged a hard tight sand.

Wells penetrating the upper portion of the sand on the Hill tract which is the highest part of the field structurally, did not have, before deepening, the high initial production obtained in edge wells. It is therefore concluded that the high initial production is due to water rather than sand conditions.

Cementing in a loose, water-washed sand, under the pictured sand conditions, is very often a difficult and doubtful procedure. If the plug is not high enough the water soon cuts new channels through the depleted sand, and enters the hole above the plug. On the other hand, if it is too high, possibly a major portion of the production is shut off. Conditioning the hole for cementing, by cleaning out cavings and thoroughly washing the walls, is probably the most important step in the operation. The chances of obtaining a tight bond are greatly increased if a shell or hard tight sand is present having sufficient strength to resist the hydrostatic head of water.

The first and second breaks which are approximately 22 feet and 58 feet from the top of the pay, while not conclusively proven as continuous throughout the entire field, are believed to exist and are logged in a number of the wells as shale, sandy shale, and lime. The first break was evident in the continuous core taken in the Humphreys Oil Company, Pure-McKie No. 25. It was composed of lime and about two feet thick. The second break is from three to four feet thick and is logged in a number of wells as shale. This break appears to separate a hard sand which lies above, from a soft sand that is logged immediately below.

The third break is located at approximately 88 feet from the top of the pay sand and it is about 37 feet thick. It is logged as shale, sandy shale, and broken lime. In the early history of the field many of the wells were completed above this break. Stroube and Stroube, Hill No. 2 was the first well completed in the lower Woodbine pay below the third break.

Representative cores through the pay portion of the Woodbine sand in different parts of the field would have conclusively determined the occurence and continuity of the impervious breaks between the pay sands, and greatly increased the effectiveness of plugging operations as they later became necessary.

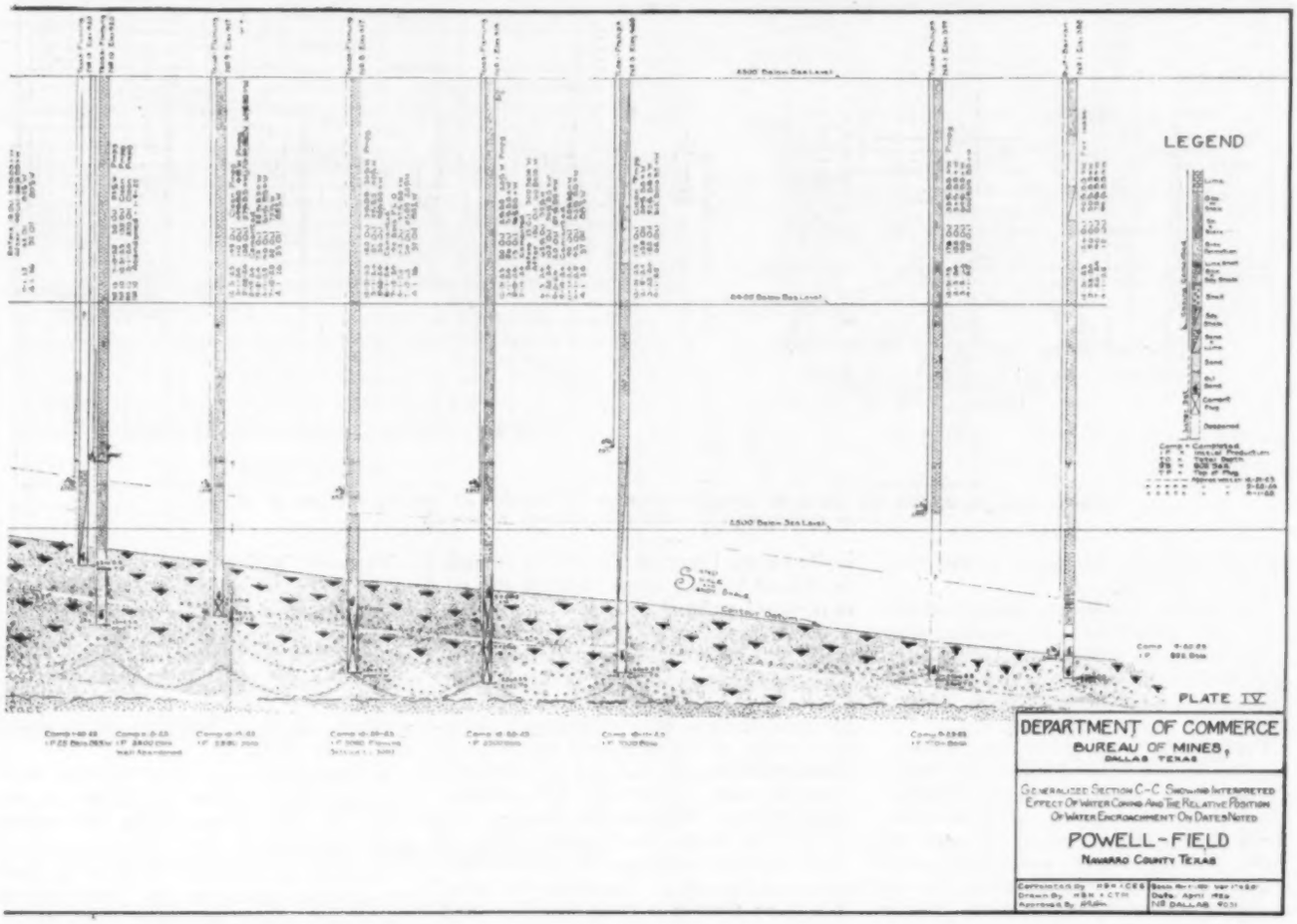
In recent years equipment has been developed that makes it possible to successfully core the different formations and to use the information thus obtained for increasing production and applying remedial measures when water or other production problems affect the property. Every core should be carefully examined and the following information noted:

1. Character and probable economic value (whether barren or oil bearing) of formations cored.

2. Texture and position of the sand and shale bodies penetrated.

3. Fossil evidence preserved for study and identification.

A special effort was made to determine the subsurface conditions as accurately as possible in the big pay zone comprising the Hill, Rose, Kellum, Wolens, Alexander, and Fleming tracts, hoping to com-


LEGEND
PLATE IV
DEPARTMENT OF COMMERCE
BUREAU OF MINES
DALLAS TEXAS
GENERALIZED SECTION C-C SHOWING INTERPRETED EFFECT OF WATER COMING AND THE RELATIVE POSITION OF WATER ENCROACHMENT ON DATES NOTED
POWELL-FIELD
NAVARRO COUNTY TEXAS

bat the ingress of water into productive portions of the pay horizons, where much recoverable oil might otherwise have been trapped by the encroachment of water. In a partially depleted sand there is always the danger of water migration to upper parts of the sand and to other parts of the field. The records indicate that probably 24 of the wells were successfully cemented back, leaving some five wells as doubtful.

The productive area in the Big Pay sand was only about 50 acres. The sand was loose and had a maximum thickness of some 30 feet, with an average of 15 feet. It was rapidly and closely drilled (one well to each 1.7 acres.) Therefore, the rapid removal of the oil and the reduction of gas pressure in this very permeable sand permitted the rapid infiltration of water and threatened the upper part of the pay that was less prolific. The nearness to the oil-water contact of these wells at the time of completion was reflected in the high initial production.

The study of the Powell field suggests an interesting relation between structure, gas pressure and volume, and water conditions as affecting the initial yields of wells in the various portions of the field.

It is the accepted theory that gas is the lifting agent that expels the fluid from drill holes and likewise forces the oil into the well, overcoming the frictional resistance of the sand reservoir, and furnishing the hydrostatic lift necessary to raise the fluid to the surface.

All the waters encountered in the field have levels considerably below the surface of the ground, and therefore, do not flow. The gas primarily can be considered responsible for the large flowing production of the many big wells in the field.

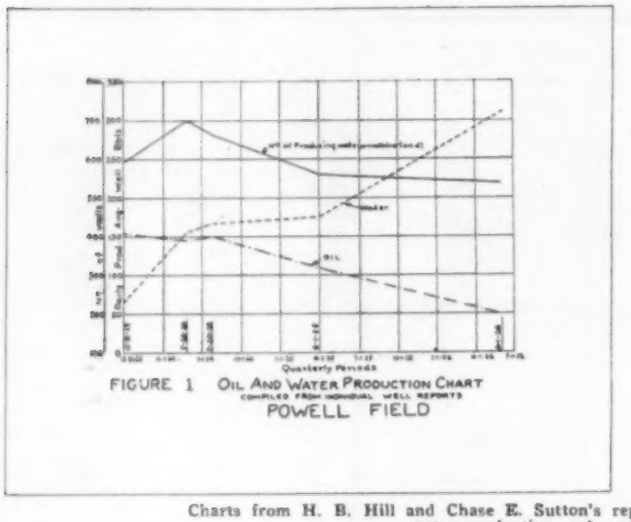
It is quite evident, however, that other factors have had a marked effect on the quantity of production obtained in some areas. The Hill tract, being the structural high of the field, would normally have been expected to produce either large oil wells or large gas wells, or both, as compared to wells less favorably located and having equal sand penetration. Other than the Big Pay sand, this was not the case and as this pay sand did not extend for any distance over the field, it is not comparable.

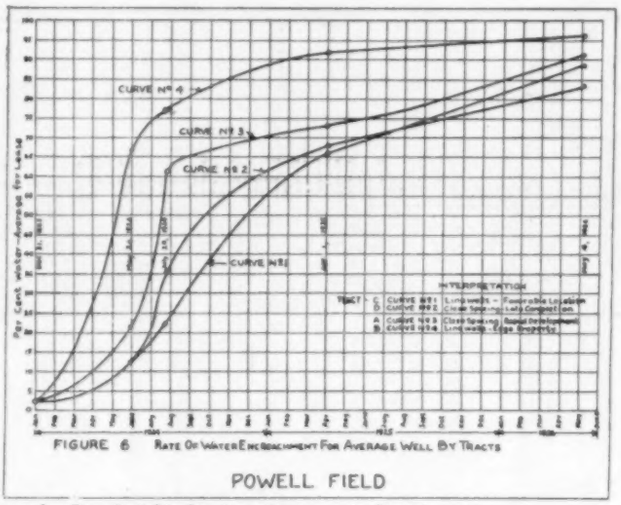
A study of the upper pay sands on the Hill tract, shows that relatively small wells were obtained in this zone as compared to wells that encountered the top of this sand at considerably greater subsea depths. As no large gas wells were obtained on the Hill tract, it cannot be explained by the usual accumulation of gas on the structural high. The proximity to the oil-water contact has a direct bearing on the productive possibilities of a given area or well. Contrary to the usual results, the wells with highest initial productions, appear to have been obtained when completed in areas where the water-oil contact was immediately below the bottom of the hole. Such results indicate that the water acted as an expulsion agent, forcing the oil toward the well and that the gas then formed the lifting agent to expel the fluid from the hole.

The disadvantages of such a condition are that the water soon finds access to the well and the numerous production problems from its presence are manifested.

It appears that operators would be considerably benefitted, at least in such cases, by maintaining as high a back pressure as possible on tubing or casinghead without affecting the oil production.

During the development of the Woodbine sand no special effort was made to control the water in either the Nacatoch or Corsicana zones. If water occurred between the bottom of the Austin chalk and the top of the Woodbine pay sand, the exact location never has been determined. Water strings were cemented as high as 130 feet above the top of the Woodbine pay with successful "shutoffs". This made it possible for operators to secure shutoff with one water string before drilling into the Woodbine production, without resorting to careful engineering, which is necessary where top water lies close to the pay sands. No instance of a





Charts from H. B. Hill and Chase E. Sutton's report on the Powell field showing the rate of oil and water production and water encroachment at Powell.

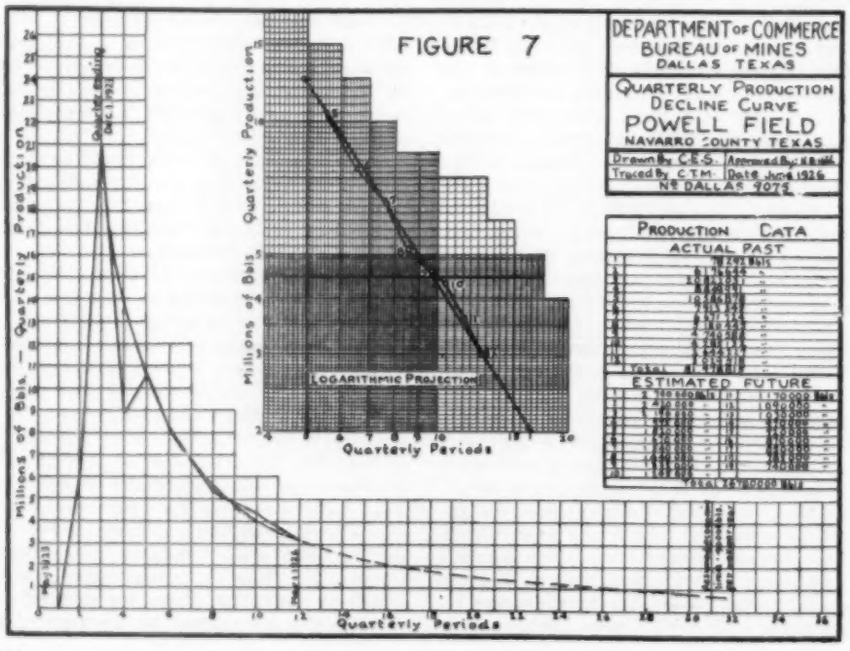
shutoff failure to top water in this field has been recorded.

Intermediate water was entirely absent from the Woodbine pay sands: edge water originally occurred in each of the sand members at their respective oil-water contacts; and bottom water was encountered below the last pay sand.

Preliminary work on water analyses, together with a detailed engineering study of the field, suggested three principal sources of water: namely, (1) a comparatively high concentrated water near the fault; (2) edge water; and (3) a bottom water. The fault water apparently is not a serious offender, and at least from a production standpoint, it is of minor importance as compared to the edge and bottom waters.

Edge water is the water that occurs naturally on the lower and down-dip portion of the oil bearing strata, and as the oil is removed and pressure on the sand relieved, this water travels in a general direction up-dip along the bedding planes, flooding the sands and trapping the oil. The rate of travel of edge water through the sand body is dependent largely upon the texture of the sand, and the rapidity with which the oil and gas are romoved from the sand. Lewis[4] in a table adopted from Slichter, illustrates the effect of the relative size of the grains and porosity of sands upon the resistance to the movement of water through it. Based on this table, it follows that in a coarse-grained sand and a fine sand, each with a porosity of 30 per cent, the water will travel 16 times faster than in a "very fine" sand of the same porosity. Consequently, as the oil sand is depleted, the movement of water to the hole is very rapid, especially through the beds of coarse sand.

[4]Lewis, J. O., Methods of increasing the recovery from oil sands; Bureau of Mines Bulletin 148, Table 2, p. 218, 1917.



The term bottom water is used in this report to describe the water occurring with and immediately below the Big Pay found on the high part of the structure in the south end of the field. This combination water and oil sand is separated from the upper portion of the pay sand by a break which is logged as shale, sand, and sandy shale.

A distinction was made between bottom and edge waters, principally on account of the difference in hydrostatic head and volume.

Information obtained from a number of superintendents in the field during June, 1926, places the water levels above the bottom of the hole at approximately 1700 feet to 2000 feet for bottom water, and from 300 to 500 feet for edge water.

Each well drilled into bottom water and not plugged back permitted the movement of the high head water to the upper sand layers, and possibly contributed in starting a combined water drive and flooding of sand on the high part of the structure. This complicated condition created by the migration of the bottom water down the dip as secondary water, and the subsequent mixing with the edge water traveling up-dip, has created a water condition, especially in the south end of the field, that is difficult to interpret.

It is evident from the data tabulated that the south and central portions of the field are producing larger amounts of water than the northern end of the field. This is due in part to the fact that a large number of heavy water producers in the north end have been plugged and abandoned.

The results of consistent plugging operations by the Pure Oil Company are also evident in the low water production per well in the north end of the field.

The average daily oil production for the month of May, 1926, was 29,398 barrels, as compared to an estimated water production of 167,000 barrels as of June 1, 1926. These figures give an average per cent water for the fluid of 85 per cent, or

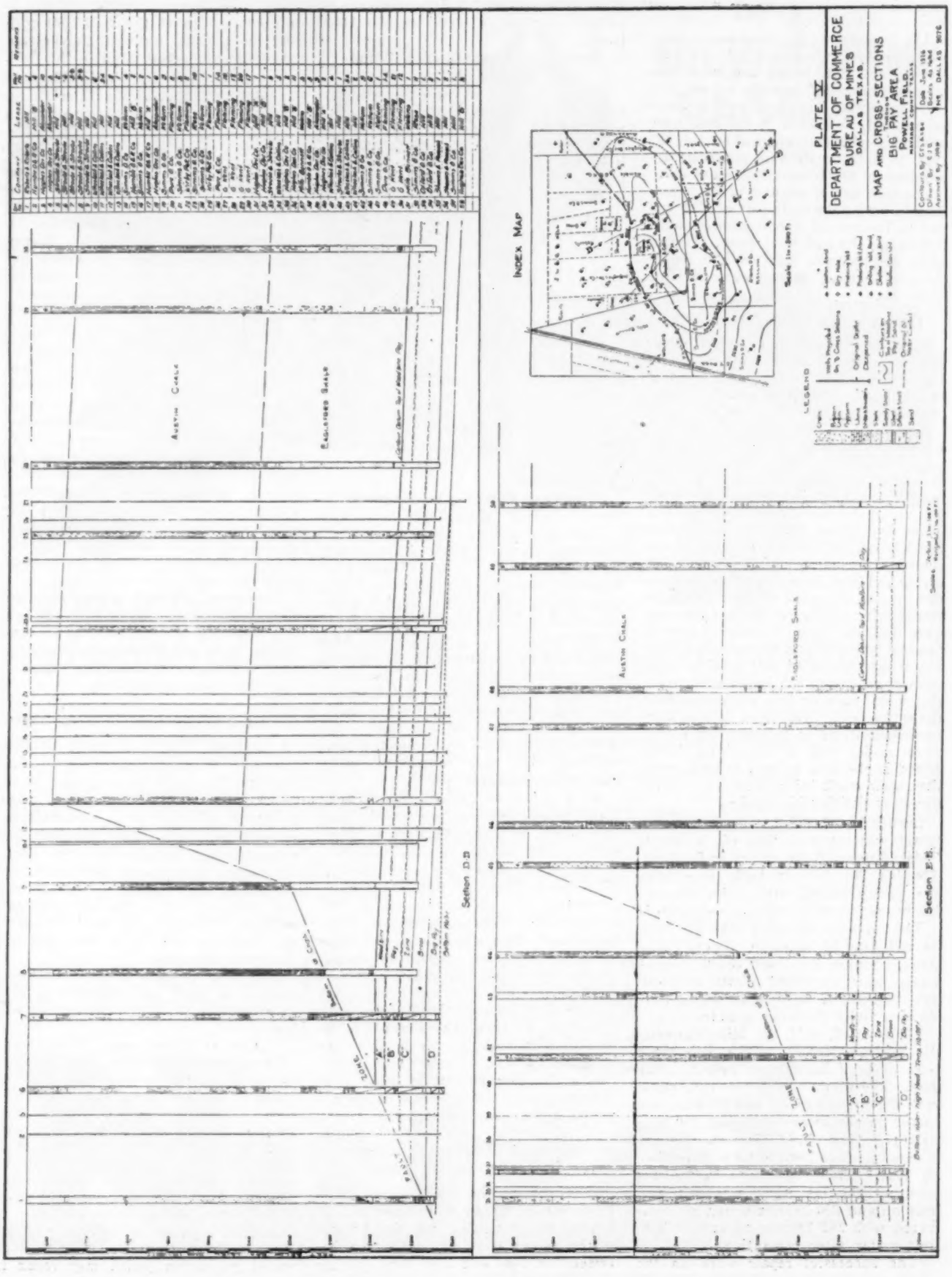


PLATE IV
DEPARTMENT OF COMMERCE
BUREAU OF MINES
DALLAS TEXAS.
MAP AND CROSS-SECTIONS
BIG PAY AREA
POWELL FIELD.
NAVARRO COUNTY TEXAS
INDEX MAP
LEGEND
Austin Chalk
Undifferentiated Sands
Section D.D
Section E.E.

approximately six barrels of water for every barrel of oil.

The flattening of the curve representing water production, between July 20, 1924, and April 1, 1925, is due largely to plugging off big water in wells on the Hill tract, and the fact that, so far as is known, only two wells in the field were producing with air; whereas on July 20, 1924, 16 wells on air were producing approximately 30,000 barrels of water daily.

The high rate of increase in water production during the early part of 1924 was due to the use of compressors on wells drilled into the high head water. The increase beginning in April, 1925, is due to the encroachment of edge water in large quantities.

History of Early Plugging Work

Early in 1924 the water began to appear in large quantities and operators were using various methods in attempting to shut it off. During the period of January, 1924 to March, 1924, some 50 or more wells were cemented back. The results were unsatisfactory in many cases. In some few the water was reduced temporarily but soon came in again. The Bureau of Mines at this time started to make a study of the pay zone in an attempt to locate impervious strata in which plugs could be set with reasonable chances for success. As no appreciable amount of coring had been done during the development period, the work of determining the stratigraphic sequence of the pay zone was quite difficult. From a study of several hundred well logs and the records of coring, it was concluded that possibly there were three breaks or impervious strata that were more or less continuous over the entire field. With these data at hand recommendations as to cementing depths were made, and a supervising driller placed in the field to keep in touch with the repair work being done, and to aid operators desiring his services.

During March, 1924, an unsuccessful tempt was made to shut off water in Tidal, Ramsey-B No. 6, and in G. Kent, Fleming No. 10. In both these jobs the tubing parted during the cementing operation and a fishing job resulted.

The next repair work was on May 14 and June 14, when the Texas Company, Fleming No. 1 and No. 8, respectively, were cemented. Both of these jobs resulted in an increase in oil production and a decrease in water.

On June 28, 1924, the Mills Bennett, K. Wolens No. 1 on the Hill tract was plugged back from 2990 to 2971 feet. The production before cementing was 100 barrels of oil and 5000 barrels water on air; after cementing, 250 barrels pipe line oil. This well was cemented back to 2950 feet on November 3, 1924. The Production before cementing the last time was 200 barrels oil and 200 barrels water, as compared with 382 barrels oil and 24 barrels water after cementing.

The successful repair work on the Mills Bennett well led to cementing back a number of wells on the Hill tract.

Results of Plugging on Hill and Wolens Tracts

At first the operators in this locality resorted to compressors to force or maintain their production along with a nominal increase of oil. In July, 1924, it became apparent that the water was gaining rapidly and production costs were at a point where operating by this method was no longer profitable.

The fact that the water level in this area stood at about 2000 feet above the sand, whereas in other parts of the field the level was between 300 and 500 feet, indicated that a new and lower water source had been tapped.

The increase in production following the repair work on eight wells in the Big Pay area is estimated at 827,700 barrels.

Of the 29 productive wells in the Big Pay sand, the record indicates that all but five have been cemented and have shut off the lower highhead water.

Results of Plugging on Magnolia I. T. Kent Tract

Another type of repair work is illustrated by plugging back wells on the Texas-Magnolia, I. T. Kent lease. This lease is favorably located in the central part of the field. Repair work consisted in plugging off edge water in the bottom of the sand. The first plugging work was completed in March 1925. Results indicated that the production could be increased by continued plugging operations on other wells. During the balance of 1925 eight wells were cemented by this company, and to May 1926, three additional wells have been cemented.

As a result of cementing the daily lease production was increased from 719 barrels in June, 1925, to a maximum of 1540 barrels in August, 1926.

The daily production as of April 1, 1925, for the average well previous to cementing was 56 barrels oil and 67 barrels water. These figures are given to indicate the production of the lease at the time plugging was commenced.

The results of plugging operations on this lease are very interesting when it is realized that of the 16 jobs completed, 15 of them have been by the dump bailer method with the liner not removed.

The plugging operations from June 1025 to April, 1926 reculted in an estmated net increase of 112,000 barrels.

Results of Plugging by Texas Company-Fleming Tract

A third lease, the Texas-Fleming, has been chosen to show the results obtained by cementing off the bottom water on an edge lease situated between the 2480 and 2540 foot contour lines. The lowest contour (2540) is only 40 feet above the 2580 foot contour line, which approximately established the production limit of the field.

Since May, 1924 the Texas Company has cemented nine of the 12 wells on the tract, several of them two or three times.

The estimated net increase in production due to plugging on this lease was 83,000 barrels. This figure is based on estimated and actual oil gauges for the individual wells from December 31, 1923, to April 1, 1926, which figures checked the pipe line runs within five per cent. The increased production for the wells is estimated for the period from cementing to April 1, 1926.

The probable reason for increased production derived from cementing back is briefly stated as follows: Generally a rapid decline in oil production immediately follows the appearance of water in large amounts and particularly when such water has free access to the well. This would indicate that the quantity of water produced was limited only by the capacity of the equipment, whereas after plugging, although the actual quantity produced in many cases is still large, the working head is reduced sufficiently to allow more oil to enter the well.

Therefore, although a plug may not completely exclude water from the well if it obstructs the channels to such an extent as to allow the pumping equipment to reduce the working head, it materially benefits the well.

Comparative Analysis of Four Tracts

A detailed study was made of four tracts to show the effect on production of (A) close spacing and rapid development; (B) line wells, edge property; (C) line wells, favorable location; and (D) close spacing late completions. The analysis of these properties showed an estimated recovery of the original content of 63.5 per cent for tract (A), as compared with 36.7 per cent for tract (B), 41.2 per cent for tract (C), and 42.8 per cent for tract (D).

The water problem on the four tracts studied, in detail and applicable to field in general is briefly summarized as follows:

1. That close and rapid development, although tending to create water cones in the vicinity of each well, possibly does not result in the trappings of large quantities of oil, as the complete drilling of the tract prevents the existence of undepleted sand areas of large extent. Consistent plugging operations under such conditions probably does not shut off major quantities of recoverable oil but should effectively reduce the water production.

2. That a policy of drilling only line wells on the larger tracts during the high initial production period may result in

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leaving considerable amounts of oil trapped in the undrilled area of the tract.

Plugging work on such a tract may prevent the recovery of the trapped oil to some extent, however if the plugs are carefully placed soon after the appearance of water the amount of oil extracted from the trapped areas may be materially increased.

3. That water encroachment follows the rate of depletion of the reservoir with the natural results that the tracts of high initial production show large amounts of water at correspondingly earlier periods than properties of lower initial production.

4. That abnormal production methods subsequent to the appearance of water tend to hasten the time of final abandonment, or the necessary corrective work, and probably do not materially increase the ultimate recovery from the tract. In fact, such operation is more likely to result in a decreased recovery of oil and an early suspension of operations due to entirely disproportionate production costs.

Results from the Application of Vacuum to Producing Wells

Abstract of paper presented at the Tulsa meeting of the Petroleum Division of the A. I. M. E.

By BEN E. LINDSLY
Petroleum Engineer, Bureau of Mines

THAT the use of vacuum in producing wells, while in some instances showing very favorable results, is not as effective as pressure methods for increasing the recovery of oil, is the findings of Ben E. Lindsly, petroleum engineer for the Bureau of Mines, who has just completed an exhaustive study of this subject.

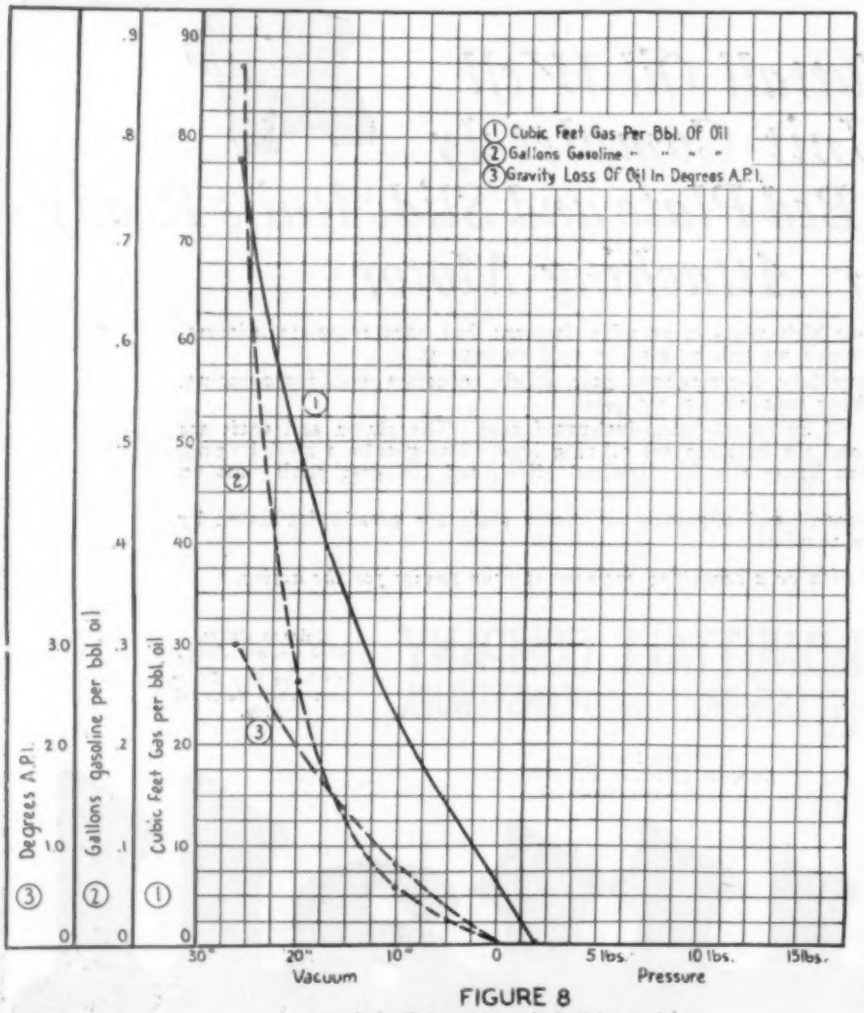

FIGURE 8
Physical effect on a barrel of oil by applying vacuum to it

Mr. Lindsly's report begins with the early application of vacuum, dating back ot a few years after the discovery of the Triumph Pool in Warren County, Pennsylvania, and brings it down to its present development in Mid-Continent fields. By permission of the director of the Bureau of Mines a paper entitled "The Use and Limitations of Vacuum in the Recovery of Oil," was read by Mr. Lindsly before the meeting of the Petroleum Division of the American Institute of Mining and Metallurgical Engineers at Tulsa, October 12th.

Specially constructed equipment enabled the author to secure conclusive evidence of the physical effect of vacuum on oil while a detailed study of the application of vacuum to the Glenn Pool and the Bartlesville District furnished data for comparative results of the method under varying conditions.

In his study of the physical effects of vacuum on oil and gas Mr. Lindsly found in one case that oil produced under 2" vacuum had a gravity of 35.6 A. P. I. It was probably slightly higher when it was produced under atmospheric pressure. Under 18" vacuum the gravity dropped to 32.8 A. P. I. The gasoline content of the gas increased during the same period from 2.9 to 7.0 gallons per M. cubic feet.

A similar effect was also shown by a vacuum test on a well in the Burbank field. Here the gravity of the oil dropped from 39.8 A. P. I. to approximately 37.6 A. P. I. under 9½" vacuum. In his report of investigations on this well the author said:

"During the cleaning out period, when vacuum was on during the night and off during the day, the gravity in-

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3 in 1 Sucker Rod Wrench

SHAFFER'S 3 in 1 Sucker Rod Wrenches*** Made to fit all sizes of Sucker rod Squares eliminating the use of several size wrenches. Properly designed and balanced to make it easy and fast to operate. Weight 6½ pounds.

SHAFFER'S TRIPLE DUTY Sucker Rod Spider*** is designed to accommodate all sizes of rods and to fit in 2"-2½" and 3" Tubing, Eliminates the use of one Elevator, making a fast and efficient tool for this purpose, Slips for all sizes of rods furnished with each Spider.

Triple Duty Sucker Rod Spider

SHAFFER'S SAFETY S LINK*** A perfect Safety Link without loose bolts or nuts to loosen and fall off. Just snap it on the line and into the Hook Bail. Strong and Durable. Made in 1½" an 2" sizes of high grade Electric Steel.

Safety S Link

SHAFFER'S SWIVEL Safety S Link*** Especially valuable in use with the sucker rod Spider as it eliminates the use of the so called Safety Rod Hooks, making a complete assembly from the line to the elevator, insuring a perfect swivel of the line at all times. Weight 30 lbs.

Swivel Safety S Link

THE SHAFFER SPECIALTY CO.

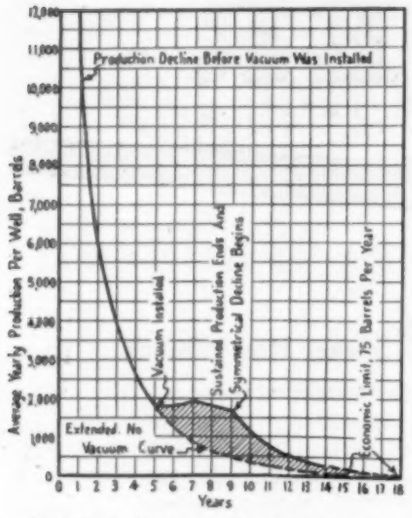
PATENTED OIL WELL EQUIPMENT

TULSA, OKLA

FOR SALE AT ALL SUPPLY STORES

Say you saw it in The OIL WEEKLY

FIGURE 9


Production Decline Before Vacuum Was Installed
Vacuum Installed
Sustained Production Ends And Symmetrical Decline Begins
Economic Limit, 75 Barrels Per Year
Extended, No Vacuum Curve
Average Yearly Production Per Well, Barrels
Years

(1) Method of determining the effect on the production of oil by introducing a change in the method of operations.
(1) W.W. Cutler Jr. Bulletin 228 U.S. Bureau of Mines - P.91

creased to 38.7 A. P. I. When the well was finally put back on regular production, and the vacuum raised to 19", the gravity of the oil dropped to approximately 36.5 A. P. I. The original gas before vacuum was applied contained 2.8 gallons per M. cubic feet. This increased to 4.8 gallons under 9-inch vacuum. It dropped to about 3.6 gallons during the cleaning out period, when the vacuum was on at night only and finally when the well was put back on regular production and the vacuum raised to 19" the gas contained approximately 6.4 gallons per M. cubic feet.

"During the first part of the test, the gain in casinghead gasoline amounted to about 110 gallons per day. The royalty value of this 110 gallons of gasoline to the oil produced would amount to $3.05 per day under a selling price of 10 cents per gallon. The loss in gravity, however, decreased the value of the total oil produced approximately $3.60 per day. As it is possible, however that vacuum caused the increase in production of about a barrel per day or $3.27 in value, it would appear that a small profit was derived by the application of vacuum. As this profit was less than $2.00 per day and as the proper application of vacuum always requires extra attention on the part of the operator, the advisability of applying vacuum in similar cases is questionable."

In still another test Mr. Lindsly found that the gravity of the oil dropped about three degrees A. P. I. due to the effect of 10" vacuum. The casinghead gasoline increased from about 0.5 G. P. M. to 2.4 G. P. M.

The author states that:

"Perhaps the most conclusive evidence relating to the physical effect of vacuum on oil was obtained by a vacuum test on a small tank of oil from the Burbank field. The tank was set on a Ford truck and the sample was taken by allowing a well which was producing under atmospheric pressure to pump its production through the tank for a period of two hours. The outlet at the top of the tank was connected to the lead line which delivered the oil to the stock tanks some 200 or 300 feet distant.

"The purpose of taking the sample in this manner was to obtain oil with its entrained gas in a condition similar to that underground. After two hours pumping the valves were closed and the tank was taken to the laboratory for testing. The test was conducted by W. B. Berwald, Assistant Petroleum Engineer of the Bureau of Mines.

"During the releasing of the two pounds pressure on the tank and the subsequent application of vacuum, the oil was kept in constant motion by means of a propeller driven by an electric motor.

"The results of the test are shown in Table 1."

"From the foregoing it seems doubtful if there is any field in the Mid-Con-

TABLE 1
Laboratory Ttest Showing Results of Applying Vacuum to Burbank Crude
40.1° A. P. I.
Vacuum Stages

	2lb-0lb	0lb-10" Vac	10"-20" Vac.	20-26" Vac.	Total	
Gravity loss degrees A. P. I.	0.1 (est.)	0.8	1.2	1.0	3.1	A.P.I.
Cu. Ft. Gas per bbl. Oil	6.374	16.05	25.63	29.95	78.004	
Gasoline recovered gals. per bbl oil	0.0017	0.0546	0.1965	0.6190	0.8717	
Gals. Gasoline per M. Cu. ft. gas	0.2685	3.42	7.67	20.65	11.22	
Oil lost per cent	0.2668	0.197	1.732	3.710	5.9058	

TABLE II

The following is an analysis of the loss which might be entailed per barrel by applying vacuum to stock tanks containing 40.1 gravity Burbank Crude:

Value before vacuum 1 barrel at $2.61	$2.61	
Value after vacuum 0.941 barrel at $2.37		$2.23
Value of 5/18 royalty on .8718 gals. Gasoline at 10 cents		0.024
	$2.61	$2.254
Loss per barrel to the producer by applying vacuum		0.356

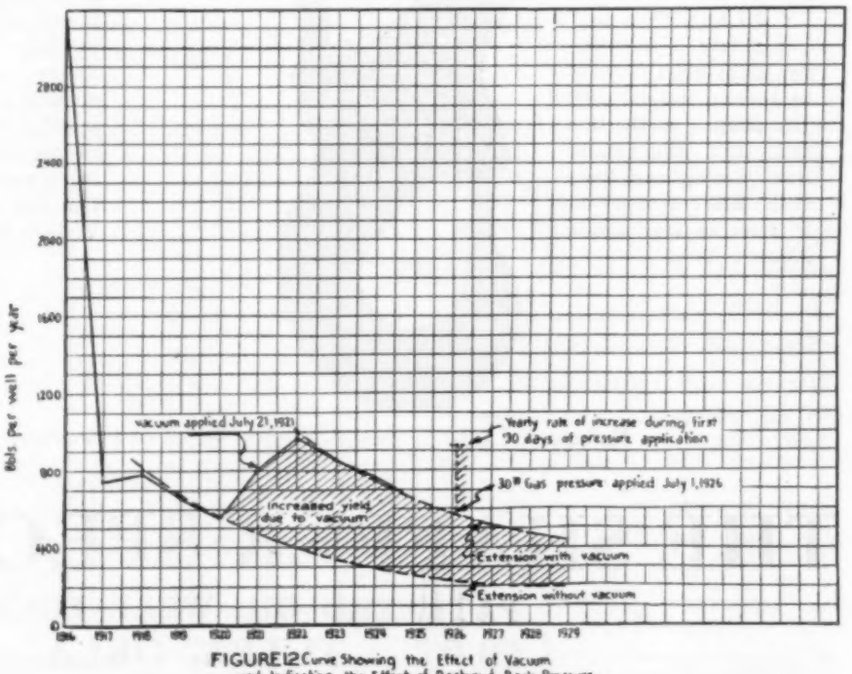
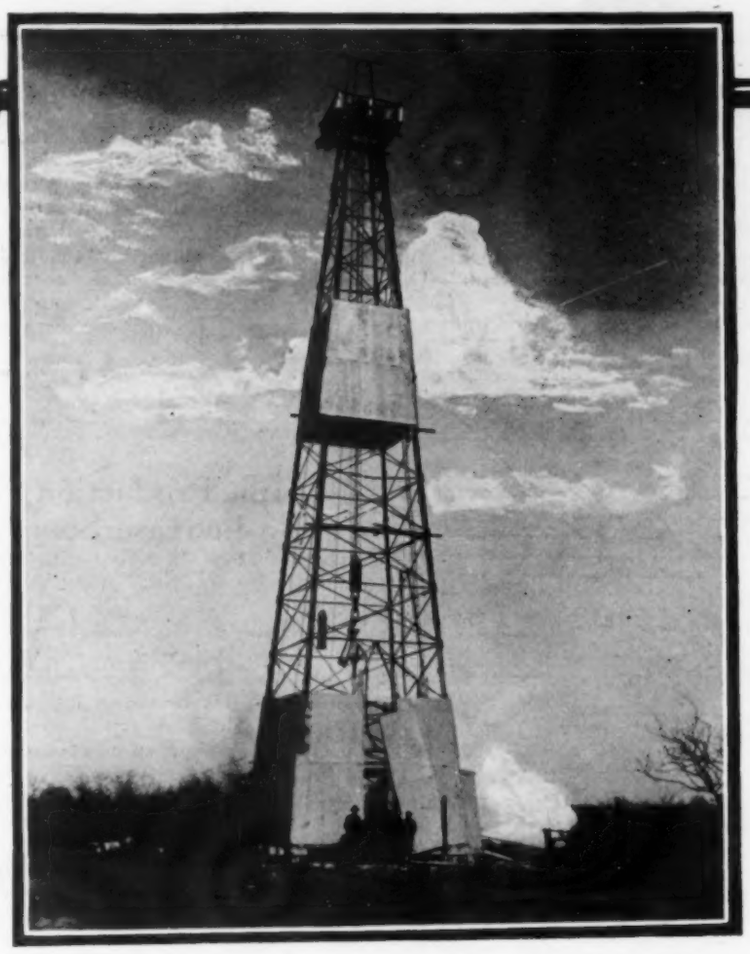

Bbls per well per year
Vacuum applied July 21, 1921
Yearly rate of increase during first 30 days of pressure application
30" Gas pressure applied July 1, 1926
Increased yield due to vacuum
Extension with vacuum
Extension without vacuum

FIGURE 12 Curve Showing the Effect of Vacuum and Indicating the Effect of Restored Rock Pressure. Burgess Sand. Washington Co. Okla.



MOORE TUBULAR STEEL DERRICKS

Double Strength With Reinforcing Legs

Moore 96 foot Rotary Derrick with reinforcing legs. Lately used for test drilling in Archer County, Texas, completing the deepest test ever drilled with rotary in that territory. Stood the worst punishment without the slightest trouble. Another Moore derrick, now in use at Big Run, Pa., has drilled to a depth of 7060 feet, and is still going strong.

DEEP TESTS

In deep test drilling, the unexpected is always apt to happen. You will be prepared for every emergency if you use a Moore tubular derrick with pipe reinforcing legs. Such a derrick has nearly double the capacity of a single leg derrick, yet its first cost is very moderate.

After the well is completed, the whole derrick, or the reinforcing legs alone can be moved and used again and again on other locations for drilling or pulling casing.

For instance, the derrick illustrated above is shown in its third location, in Archer County, Texas. At one time, it supported the weight of 54 thribbles of 4-inch drill stem hanging in the derrick. On another occasion, the pipe was frozen and the derrick several times parted the 4-inch 12½ lb. drill stem. Such instances are typical of the giant strength of Moore Derricks with reinforcing legs.

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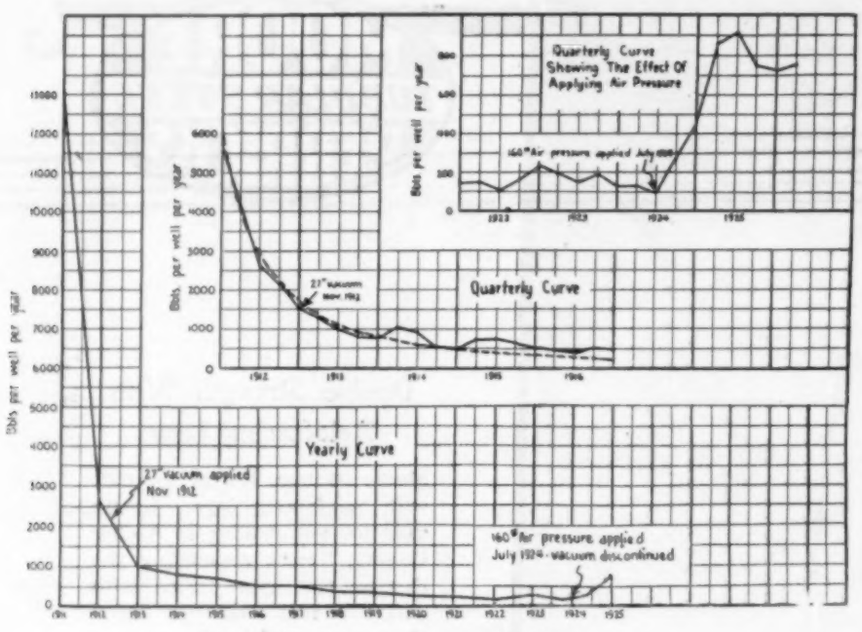
Quarterly Curve Showing The Effect Of Applying Air Pressure
160# Air pressure applied July 1924
Bbls. per well per year
Quarterly Curve
27" vacuum applied Nov 1921
Yearly Curve
27" vacuum applied Nov 1921
160# Air pressure applied July 1924 - vacuum discontinued

FIGURE 13 Curves Showing the Effect of Vacuum and Restoring the Rock Pressure on a Lease in Northeastern Oklahoma.

tinent that will show a net profit if vacuum is applied to the storage tanks and gas traps. The fact that the gas may contain 11 or 12 gallons of gasoline per thousand cubic feet is apt to be misleading. Even the gas produced on the 26" stage of this test, which showed a gasoline content of 20.65 gallons per M. cubic feet yielded only .619 gallons of gasoline per barrel of oil. The royalty from this would amount to only 1.7 cents, and the loss in gravity of one degree would be 8 cents. As the volume of the oil was reduced by 3.71 per cent the barrel of oil was further depreciated in value approximately 8.8 cents. Thus by removing approximately 30 cubic feet of 21 gallon gas from the oil a net loss of 15 cents per barrel was sustained."

In studying the effect of vacuum on production Mr. Lindsly points out that the texture of the sand determines to a great extent the results obtained from this practice. However, even in cases where conditions have been favorable for the application of vacuum and great increases in ultimate yield have been effected it is suggested that pressure methods of recovering oil would have given even greater results.

The Glenn Pool was picked up as an example of a field with a coarse sand susceptible to vacuum while in contrast the Bartlesville district is cited as presenting a reverse condition, of a fine grained sand; and the successful application of vacuum is the exception rather than the rule.

In the accompanying Figure 9, a group of 368 wells are represented. The estimated increase as a result of the application of vacuum is from 34,350 to 41,500 barrels per well, or about 21 per cent. This is an example of the most favorable application of vacuum.

In taking up the discussion of the application of vacuum compared to the restoration of rock pressure, Mr. Lindsly points out:

"In districts where vacuum has been particularly effective, present indications are the wells respond readily to the compressed air process of restoring rock pressure. In other places where vacuum has had little or no effect, the production does not respond to air pressure until comparatively high pressures are reached. On one property where a vacuum test had peviously failed to show favorable results, the production was not effected by the subsequent application of pressure until a pressure of 400 pounds per square inch was attained. At that pressure a satisfactory increase resulted.

"Figures 12 and 13 illustrate the point in question. The property represented by Figure 12 responded immediately to vacuum in July, 1921, and a large increase in ultimate production resulted during the five years following. On July 1, 1926, 30 pounds gas pressure was applied and eleven days after there was a noticeable increase in production. During the balance of the month the property produced at a rate practically equal to the peak production under vacuum in 1922, and at a somewhat greater rate than the production several years prior in 1917.

"It is interesting to compare this property, which responded readily to vacuum with the property represented in Figure 13, which was not affected to any great extent when vacuum was applied, but which was favorably affected about five weeks after the application of 160 pounds air pressure in July 1924. In the one case where the property was readily affected by vacuum, it responded to a comparatively low pressure a few years later. In the other case, where vacuum had little or no effect, it required a much higher air pressure to increase its production."

Montana Production Not To Increase Soon

Great Falls, Mont.—A still further decrease in Montana production and the recent increases in crude prices have served to somewhat alarm leading enhusiasts, who have watched Montana production climb from a few hundred barrels to almost 30,000 daily. Although it does not acually mean that the potential production of the State is declining, it serves to excite those who are not familiar with the situation. The chief cause is the falling off of Kevn-Sunburst production. The recent depression in the field caused the large operators to partially shut down to bring about better conditions. The shut down had its effect, the prices soaring immediately after consumption approached production. It is considered a certainty that the production will again reach its recent high mak. The Kevin-Sunburst field is less than half drilled. Production is not expected to reach 25,000 barrels daily in the field for several months, however.

The Kevin-Sunburst field now has 612 producing oil wells, 60 producing gas wells, 37 drilling wells and 33 rigs and locations. More than 100 failures have been drilled in the field. The field was discovered less than five years ago. The Sunburst sand was first found to contain oil. Slightly deeper drilling disclosed the Ellis sand, which is the principal producing horizon. The Madison lime was found to contain oil in large quantities long after the upper sands had been found productive.

Use Diamond Drill

Casper, Wyo.—The Texas Production Company has purchased a diamond drill to finish its deep test in the Big Sand Draw field. The company had a great deal of trouble in casing off the gas sand prior to deeper drilling. Since this has been accomplished, many difficulties have arisen. The company is now fishing for casing dropped in the hole.

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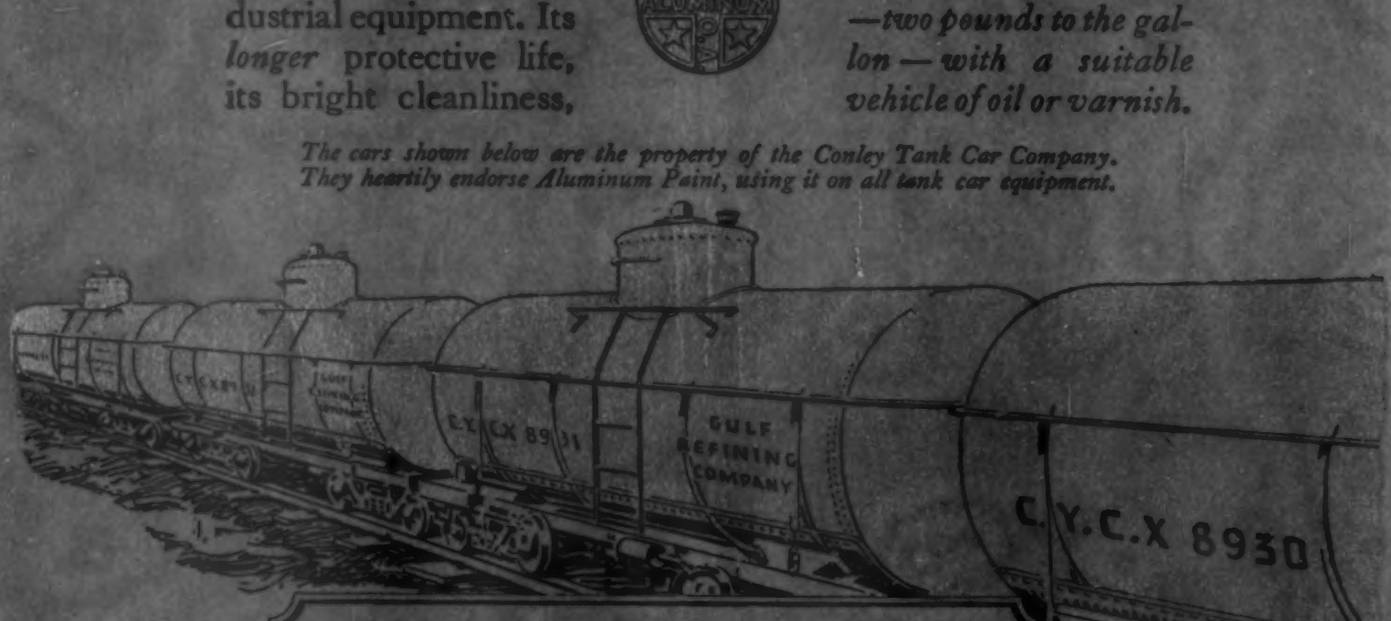

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ALUMINUM IN EVERY COMMERCIAL FORM

Theories of Production and Methods of Introducing Gas and Air to Increase Recovery

(Continued from page 46.)

and the differential in pressure so necessary to produce the oil is supplied and maintained by the operator himself.

Subsurface Action

Once that absorption of the injected gas has taken place it again performs its original function, that is of revaporizing upon a slight reduction in pressure. Again the little bubbles are formed, each surrounded by its film of oil, again these bubbles pass through a veritable sieve, and again they are separated into a thousand little bubbles, each one of which carries its film of oil until finally they find their way into the surrounding producing wells. Here, they deposit their load, thus contribution to the general accumulation of oil in the hole. As before, they burst and rise again to the surface as casinghead gas.

Gasoline Recovery

When dry gas is introduced into a sand where intimate contact with the oil takes place, there can be little doubt that it goes into solution, later expanding and performing its duty of bringing oil into the surrounding wells, and thus picks up gasoline vapors which may be extracted in a gasoline plant. The dry gas now converted into a wet gas will be found to contain very nearly the same gasoline content as the original natural wet gas.

In support of this statement, there is an old property in Pennsylvania upon which a gasoline plant had practically ceased to be profitable, due to the serious depletion of their source of supply of wet gas. An experiment was attempted whereby natural dry gas was purchased from one of the public service gas companies at 60 cents per thousand feet and injected into the sand through one of the old producing wells. Soon it was found that the normal oil production and the supply of wet gas had gradually increased until the gasoline plant became an asset instead of a liability. Today this company finds itself with almost enough gas for constant circulation and the necessity of purchase of the expensive natural gas has practically disappared.

Conclusion

We have heretofore pointed out that gas must be conserved; we have also shown that it furnishes the energy for actually producing the oil. Now, we advocate its re-introduction into the oil sand to perform its proper function of producing additional oil and thereby reduce the so-called unrecoverable remainder heretofore left in the sand.

It is the very life of your property. Its waste today, in view of all we know of its importance, of its utter necessity, is little short of criminal. You are dealing with a wasting asset, one which you are unable to replace. If you are to return to a financial profit to your concern in the future you must now come to the realization that gas is your most valuable asset. Nature has placed it in your hands. Concede its value and give it its place in the industry.

Increasing Recovery and its Economic Effects

(Continued from page 48.)

same through the introduction of soda ash, or other chemicals having similar effect, offers possibilities in areas that are now about dead and gone insofar as commercial production is concerned.

The mining of oil originated in Europe and has been successfully carried on in the Pechebronn fields in Alsace-Loraine. Ranney and others are carrying on extensive experiments in this country that offer commercial possibilities and have combined the straight mining or tunneling processes with the use of the vacuum, and of the gas drive. There are many physical difficulties to be overcome before any mining processes can be developed on a scale to where they will be a big factor commercially. It is well to note, however, that there are many now depleted or nearly depleted shallow areas where the application of some form of this process appears entirely feasible and which only await a favorable price of crude and suitable methods before such operations are initiated.

The term "laterals" as applied to mining, brings to mind the possibility of the development of a method of drilling lateral holes into oil sands after the wells have been vertically completed. We understand that some very interesting work has been done along these lines with apparently satisfactory results. The general use of such a system offers material possibilities in that it would permit more drainage surfaces than is possible under present drilling systems. Its successful use would also facilitate recoveries in connection with gas drives.

Economic Affect of New Methods

No one can safely predict the effect that the general adoption of modern mechanical improvements and new production methods will have upon the gross oil production in the United States or elsewhere. We thoroughly appreciate the possible signnificance of the use of these ideas but we feel that any attempt at an estimation of the barrelage results that might be expected from their use would be misleading and hardly worth while, at this time. The use of improved devices and equipment coupled with more mature knowledge of underground conditions and of well production methods will undoubedly lead to a more careful and scientific handling of individual wells than has existed in the past, and greatly prolong production. The outlook for increased production in many areas that have been of comparatively small aggregate importance is most encouraging. The demand for crude, together with increasing prices, will make possible the adoption of improvements in present practice that should put on the market in many areas an amount of oil two or three times in excess of that already produced.

However, until the development of these new practices and methods is extended to where they can be successfully applied to all types of fields, it is not believed that they will have a material effect on total daily output in the Mid-Continent.

The Application of Pressure to the Elliott Pool, Nowata County, Oklahoma

(Continued from page 52.)

crease is repair parts and labor necessitated by the big increase in machinery.

In connection with operation costs an experiment we made in drilling more wells to increase production is interesting. Thinking that considerable oil was being lost due to a lack of wells in certain areas, fourteen wells were drilled, about half of them along the east side of the pool and the rest scattered through the pool wherever it appeared that another well was needed. Two of these wells were dry and two were used as air wells leaving ten producers which have not produced over ten barrels per day and as air had already affected the area, no further increase can be expected. This would indicate that drilling oil wells in air properties is not worth while for their initial production is not as high as their settled production and a two or three barrel well will hardly pay out.

Only along the edge of the pool is there any oil that could have been considered unattainable with existing wells for the area drillied in the pool proper would have ultimately been affected. But one barrel wells cannot be considered economically worth while.

Conclusion

Referring back to the results of Eastern plants, some of which although thirteen to fourteen years old, still make more oil than before air was introduced and considering that we have a three to four hundred per cent increase in production, we can reasonably expect to produce about three per cent of the original pool content in place of 9/10 of 1 per cent to be expected from regular production during the next ten years.

Considering this as a typical first class air installation on Bartlesville sand, it becomes evident that with such an increased yield, that the application of air to this sand is profitable and in the conservation of our natural resources, necessary.

West Texas Office Moved

Midland, Texas—The production and scouting headquarters of the Gulf Production Company in West Texas were moved from San Angelo to Midland Saturday. This move was made to afford closer contact with the Gulf's properties in the Crane-Upton County district. M. O. Boren is in charge of both production and scouting, with Bob Patterson assisting.

CRUDE OIL PRICE QUOTATIONS

Crude Price Changes

October 14.—Effective at the opening of the market today, Grayburg Pipe Line Company posted a revision of the gravity schedule on Somerset crude, making the top grade 38 and above. The revision also brought an average increase of 15 cents per barrel in the price.

Pioneer Oil and Refining Company met Grayburg's change on October 15.

Current Postings

EASTERN STATES

	Oct. 20 1926
New York Transit	3.40
Bradford District	3.40
National Transit	3.30
Southwest	3.30
Eureka	3.25
Macksburg	3.05
Gaines	2.85
Somerset medium	2.50
Somerset light	2.65
Cabell	2.40
Ragland	1.25
Corning	2.55
Keister	2.05

CENTRAL STATES

Illinois	2.37
Indiana	2.25
Lima	2.48
Plymouth	1.90
Princeton	2.37
Waterloo	1.35
Wooster	2.55

WESTERN KENTUCKY

Posted by Indian Refining Company for crude from Allen, Warren, Franklin, Davies, Barren, Cumberland and Monroe Counties

36 and above	2.05

MID-CONTINENT

	Prairie Sinclair* Texas Gulf	Magnolia
Below 28	...	1.30
28 to 28.9 gravity	1.65	1.65
29 to 29.9 gravity	1.73	1.73
30 to 30.9 gravity	1.81	1.81
31 to 31.9 gravity	1.89	1.89
32 to 32.9 gravity	1.97	1.97
33 to 33.9 gravity	2.05	2.05
34 to 34.9 gravity	2.13	2.13
35 to 35.9 gravity	2.21	2.21
36 to 36.9 gravity	2.29	2.29
37 to 37.9 gravity	2.37	2.37
38 to 38.9 gravity	2.45	2.45
39 to 39.9 gravity	2.53	2.53
40 to 40.9 gravity	2.61	2.61
41 to 41.9 gravity	2.69	2.69
42 to 42.9 gravity	2.77	2.77
43 to 43.9 gravity	2.85	2.85
44 to 44.9 gravity	2.93	2.93
45 to 45.9 gravity	3.01	3.01
46 to 46.9 gravity	3.09	3.09
47 to 47.9 gravity	3.17	3.17
48 to 48.9 gravity	3.25	3.25
49 to 49.9 gravity	3.33	3.33
50 to 50.9 gravity	3.41	3.41
51 to 51.9 gravity	3.49	3.49
52 and above	3.57	3.57

NORTH AND CENTRAL TEXAS

Ranger, North Texas, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Moran, Somerset, Big Lake and Nocona crude

Humble O. & R. Co.* and Texas Co.

	Oct. 20 1926
28 to 28.9 gravity	1.65
29 to 29.9 gravity	1.73
30 to 30.9 gravity	1.81
31 to 31.9 gravity	1.89
32 to 32.9 gravity	1.97
33 to 33.9 gravity	2.05
34 to 34.9 gravity	2.13
35 to 35.9 gravity	2.21
36 to 36.9 gravity	2.29
37 to 37.9 gravity	2.37
38 to 38.9 gravity	2.45
39 to 39.9 gravity	.253
40 to 40.9 gravity	2.61
41 to 41.9 gravity	2.69
42 to 42.9 gravity	2.77
43 to 43.9 gravity	2.85
44 to 44.9 gravity	2.93
45 to 45.9 gravity	3.01
46 to 46.9 gravity	3.09
47 to 47.9 gravity	3.17
48 to 48.9 gravity	3.25
49 to 49.9 gravity	3.33
50 to 50.9 gravity	3.41
51 to 51.9 gravity	3.49
52 and above	3.57

Corsicana Heavy $1.25 per barrel, posted by Magnolia.

*Until further notice, Ranger, North Texas, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Moran and Nocona crudes purchased by the Humble Oil and Refining Company, of a gravity lower than 28 degrees will be paid for with a corresponding decrease of eight (8) cents per barrel for each lower degree of gravity.

SOUTH TEXAS

	Oct. 20 1926
Mirando	1.25

SOMERSET

Grayburg and Pioneer

28 to 28.9	1.25
29 to 29.9	1.30
30 to 30.9	1.36
31 to 31.9	1.54
32 to 32.9	1.62
33 to 33.9	1.70
34 to 34.9	1.78
35 to 35.9	1.86
36 to 36.9	1.94
37 to 37.9	2.02
38 and up	2.10

GULF COAST

All fields except Spindletop

Grade "A" all companies	1.40
Grade "B"	1.50
Gulf Coast Light Oil, Below 25	1.40
25 to 25.9	1.45
26 to 26.9	1.50
27 to 27.9	1.55
28 to 28.9	1.60
29 to 29.9	1.65
30 to 30.9	1.70
31 to 31.9	1.75
32 to 32.9	1.80
33 to 33.9	1.85
34 to 34.9	1.90
35 to 35.9	1.95
36 to 36.9	2.10
37 to 37.9	2.15
38 to 38.9	2.20
39 to 39.9	2.25
40 and above	2.30

*Humble Oil and Refining Company's postings on Gulf Coast Light stop at 35 to 35.9. Its price on all crude above 35 is $1.95 per barrel.

(Continued on page 70.)

California Crude Oil Prices at the Well

Following are the current prices offered by Standard Oil Company for crude oil at the well: (Price per barrel of 42 gallons in fields indicated)

Gravity (degrees)	Signal Hill	Huntington Beach	Inglewood	Olinda-Brea Canon	Rosecrans Dominguez	Torrance	Richfield	Whittier	La Habra	Montebello	Coyote Hills	Santa Fe Springs	Newhall	Midway-Sunset Elk Hills	McKittrick	Lost Hills	Coalinga	Kern River	Wheeler Ridge
14-14.9	$ .85	$ .85	$ .85	$ .85	$ ..	$ .85	$ .85	$ .85	$ .85	$ .85	$ .85	$ ..	$ .75	$ .75	$ .75	$ .75	$ .75	$ .75	$ .75
15-15.9	.87	.87	.87	.87	..	.87	.87	.85	.85	.85	.85	..	.75	.75	.75	.75	.75	.75	.75
16-16.9	.90	.90	.90	.90	..	.90	.90	.85	.85	.85	.85	..	.75	.75	.75	.75	.75	.75	.75
17-17.9	.94	.94	.94	.94	..	.94	.94	.85	.85	.85	.85	..	.75	.75	.75	.75	.75	.75	.75
18-18.9	.98	.98	.98	.98	..	.98	.98	.86	.86	.86	.86	..	.75	.75	.75	.75	.75	.75	.75
19-19.9	1.04	1.04	1.04	1.04	..	1.04	1.04	.87	.87	.87	.87	..	.75	.75	.75	.75	.75	.75	.75
20-20.9	1.10	1.10	1.10	1.10	..	1.10	1.10	.89	.89	.89	.90	..	..	.82	..	.82	.79	..	.78
21-21.9	1.16	1.16	1.16	1.16	..	1.16	1.16	.91	.91	.91	.98	..	..	.90	..	.90	.86	..	.81
22-22.9	1.22	1.22	1.22	1.22	..	1.22	1.22	.94	.94	.94	1.06	..	..	1.00	..	1.00	.93	..	.85
23-23.9	1.28	1.28	1.28	1.28	..	1.28	1.28	..	..	.97	1.14	..	..	1.11	..	1.11	1.00	..	.89
24-24.9	1.34	1.34	1.34	1.34	1.34	1.34	1.34	..	..	1.01	1.22	1.02	..	1.22	..	1.22	1.07	..	.93
25-25.9	1.40	1.40	1.40	1.40	1.40	1.40	1.40	..	..	1.05	1.30	1.08	..	1.33	..	1.33	1.14	..	.97
26-26.9	1.46	1.46	1.46	1.46	1.46	1.46	1.46	..	..	1.09	1.38	1.16	..	1.44	..	1.44	1.21	..	1.01
27-27.9	1.52	1.52	1.52	1.52	1.52	1.52	1.52	..	..	1.13	1.46	1.24	..	1.55	..	1.55	1.28	..	1.05
28-28.9	1.58	1.58	1.58	1.58	1.58	1.58	1.58	..	..	1.17	1.54	1.32	..	1.66	..	1.66	1.35	..	..
29-29.9	1.64	1.64	..	1.64	1.64	..	1.64	..	..	1.21	1.62	1.40	..	1.77	..	1.77	1.42	..	..
30-30.9	1.70	1.70	..	1.70	1.70	..	1.70	..	..	1.25	1.70	1.48	..	1.88	..	1.88	1.49	..	..
31-31.9	1.76	1.76	..	..	1.76	..	..	..	..	..	..	1.60	..	1.99	..	1.99	1.56	..	..
32-32.9	1.84	1.84	..	..	1.84	..	..	..	..	..	..	1.72	..	2.10	..	2.10	1.63	..	..
33-33.9	..	..	..	..	1.92	..	..	..	..	..	..	1.84	..	2.21	..	2.21	1.70	..	..
34-34.9	..	..	..	..	2.00	..	..	..	..	..	..	1.96	..	..	..	2.32	1.77	..	..
35-35.9	..	..	..	..	2.08	..	..	..	..	..	..	2.08	..	..	..	..	1.84	..	..
36-36.9	..	..	..	..	2.16	..	..	..	..	..	..	2.16	..	..	..	..	..	..	..
37-37.9	..	..	..	..	2.24	..	..	..	..	..	..	2.24	..	..	..	..	..	..	..
38-38.9	..	..	..	..	2.34	..	..	..	..	..	..	2.31	..	..	..	..	..	..	..
39-39.9	..	..	..	..	2.44	..	..	..	..	..	..	2.44	..	..	..	..	..	..	..
40-40.9	..	..	..	..	2.54	..	..	..	..	..	..	..	..	..	..	..	..	..	..
41-41.9	..	..	..	..	2.64	..	..	..	..	..	..	..	..	..	..	..	..	..	..
42-42.9	..	..	..	..	2.74	..	..	..	..	..	..	..	..	..	..	..	..	..	..

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SPINDLETOP LIGHT

	Oct. 20 1926
Posted by Gulf Pipe Line Company, Humble Oil and Refining Company, Magnolia and Texas Company. Other companies buying Spindletop crude on regular Gulf Coast basis as shown above.	
Below 25 gravity	*1.25
25 to 25.9	1.30
26 to 26.9	1.35
27 to 27.9	1.40
28 to 28.9	1.45
29 to 29.9	1.50
30 to 30.9	1.55
31 to 31.9	1.60

*The Texas Company does not post prices on this grade.

SPINDLETOP HEAVY

The following prices are posted only by the Gulf and Magnolia.

Grade "A"	1.25
Grade "B"	1.15

LULING

Based on Contract	1.30

TEXAS PANHANDLE

Magnolia Petroleum Company

Hutchinson, Carson and Gray counties, all grades	$1.25

Humble Oil & Refining Company

Hutchinson and Carson counties, all grades	1.25

Other Panhandle Crudes (See table below).

Kay County Gas Company
Hutchinson and Carson Counties

All grades	1.25

Kay County Gas Company and Gulf Pipe Line Company's posting on all grades of Panhandle crude and Humble Oil & Refining Company's posting on Panhandle crude outside of Hutchinson and Carson Counties.

28 to 28.9 gravity	$1.35
29 to 29.9 gravity	1.40
30 to 30.9 gravity	1.45
31 to 31.9 gravity	1.50
32 to 32.9 gravity	1.55
33 to 33.9 gravity	1.60
34 to 34.9 gravity	1.65
35 to 35.9 gravity	1.70
36 to 36.9 gravity	1.75
37 to 37.9 gravity	1.80
38 to 38.9 gravity	1.85
39 and above	1.90
(Humble Oil and Refining Company Only)	
39 to 39.9 gravity	**1.90**
40 to 40.9 gravity	**1.95**
41 to 41.9 gravity	**2.00**
42 to 42.9 gravity	**2.05**
43 to 43.9 gravity	**2.10**
44 and above	**2.15**

CRANE-UPTON COUNTIES

Posted by Kay County Gas Company

Below 26 gravity	$ .80
26 to 26.9 gravity	.85
27 to 27.9 gravity	.90
28 to 28.9 gravity	.95
29 to 29.9 gravity	1.00
30 to 30.9 gravity	1.05
31 to 31.9 gravity	1.10
32 to 32.9 gravity	1.15
33 to 33.9 gravity	1.20
34 to 34.9 gravity	1.25
35 to 35.9 gravity	1.30
36 and above	1.35

WYOMING-MONTANA

Wyoming

Byron	2.25
Ferris	1.53
Elk Basin	2.40
Grass Creek	2.40
Rock Creek	2.40
Lost Soldier	1.10
Lance Creek	2.40
Mule Creek	1.75
Notches	.65
Big Muddy	2.25
Osage	2.15
Hamilton Dome	.73
Pilot Butte	1.75
Torchlight-Greybull	2.15
Lander	1.10

Salt Creek
(Midwest Refining Company)

29 to 29.9 gravity	1.73
30 to 30.9 gravity	1.81
31 to 31.9 gravity	1.89
32 to 32.9 gravity	1.97
33 to 33.9 gravity	2.05
34 to 34.9 gravity	2.13
35 to 35.9 gravity	2.21
36 to 36.9 gravity	2.29
37 to 37.9 gravity	2.37

Montana

Sunburst	1.35
Cat Creek	2.15

NEW MEXICO

Artesia	1.95
Hogback	1.95

CANADIAN CRUDE

Oil Springs	2.95
Petrolia	2.80

*Bounty on Canadian crude is ¾ cent per gallon, or 26¼ cents per barrel.

LOUISIANA-ARKANSAS

Caddo Light

38 gravity and above	2.45
35 to 37.9 gravity	2.35
32 to 34.9 gravity	2.25
*Below 32 gravity	2.10

Caddo Heavy

Below 26.0	1.40
26 to 28.9	1.55
29 to 31.9	1.70

Homer

Below 31 gravity	1.85
35 gravity and above	2.20
33 to 34.9 gravity	2.10
31 to 31.9 gravity	2.00

Cotton Valley

All Grades	1.20

Haynesville

33 gravity and above	2.10
Below 33 gravity	2.00

Pine Island
(Posted by Magnolia)

Below 26	1.40
26 to 28.9	1.55
29 to 31	1.70
32 to 34.9	2.25
35 to 37.9	2.35
38 and above	2.45

Bull Bayou

38 gravity and above	2.25
35 to 37.9 gravity	2.10
32 to 34.9 gravity	1.95
De Soto crude	2.30
Crichton	2.10
Bellevue	1.40
Jennings	1.50
Vinton	1.50
Edgerly crude	1.50
Urania	1.10

Smackover
(Standard, Gulf, Louisiana, Shreveport-El Dorado and Atlanta)

27 and above	1.50
26 to 26.9 gravity	1.45
25 to 25.9 gravity	1.40
24 to 24.9 gravity	1.35
Below 24 gravity	1.10

The Texas Company

27 and above	1.50
26 to 26.9 gravity	1.45
25 to 25.9 gravity	1.40
24 to 24.9 gravity	1.30
Below 24 gravity	1.10

El Dorado and Lisbon
(Atlantic)

37 and above at 60 degrees	2.30
35 to 36.9 gravity	2.20
33 to 34.9 gravity	2.10
Below 33 gravity	2.00
East Field (Calion)	.95

Stephens District

26 gravity and above	1.65
Below 26 gravity	1.45

*The Texas Company's posting on below 32 gravity is $1.85.

Steve Farish, president of the Navarro Oil Company, Houston, and president of the Reed Roller Bit Company, returned home last week after an extended visit in the East.

Miss Gladys W. Hawley is a recent addition to the geological staff of the Sa'urian Oil Company in Tulsa.

Increased Oil Production In Argentina

Washington, D. C.—The net production of crude oil in the State oilfields of Argentina during 1925 amounted to 3,894,351 barrels, an increase of more than 900,000 barrels over the 1924 production, according to a report from Assistant Trade Commissioner Sherwood H. Avery, Buenos Aires, to the Department of Commerce.

The production of the private oil companies during the year is not given in the official figures, but is reliably estimated at 2,054,480 barrels. The greater part of the government oil production came from Comodoro Rivadavia, where 257 wells were operating in 1925, the other 15 wells which contributed to the state total being in Plaza Huincul. The state drilled 129 new wells at Comodoro Rivadavia during the year, totaling 81,306 meters of drilling, and drilling at the other field came to 6,685 meters.

The oil fleet of the petroleum division of the Argentine government has recently been increased to six tank ships, and a seventh tanker, contracted for in England, is to be delivered shortly. The registry of these ships will then be 47,644 tons. Three barges and two tug boats are also to be added to the fleet.

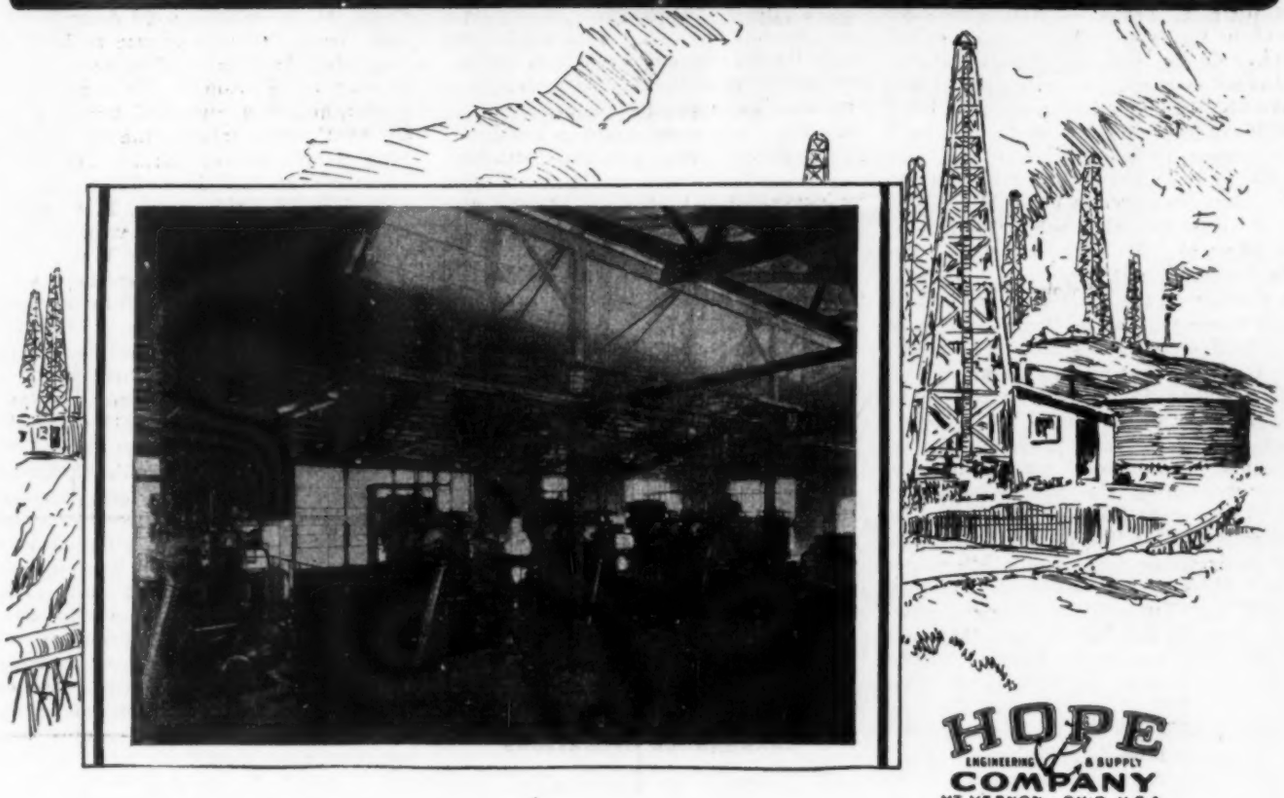
Petroleum sales in Argentina during 1925 included 519,080 tons of crude petroleum, 5,603,354 liters of gasoline, 338,274 of aviation gasoline, 4,578,073 of kerosene and 205,213 of gas oil. These are all large increases over the corresponding figures for the preceding year, the increase in sales of aviation gasoline amounting to considerably over 100 per cent. The sale and distribution of the petroleum products of the Argentine government was awarded by public bid, but the petroleum division is retaining control, an arrangement which the minister's report states has proved satisfactory.

Halt Work of Sweet Grass Hills Test

Great Falls, Mont.—A sudden halt has been called by the Bell-Fey interests who are drilling in the Sweet Grass hills, northeast of the Kevin-Sunburst field. The landowners have refused to renew the leases without cash payments. The Bell-Fey interests have retailiated by offering to abandon the test entirely, although the hole is nearly 2000 feet deep and more than $20,000 have been spent. The abandonment will be a keen disappointment as the sand was anticipated within the next few hundred feet. The well had been drilled with funds secured here and there and the investors stand an excellent chance of losing the greater part of their original investment unless the test is continued.

Walter C. Teagle and W. S. Farish left Houston late last week to make a tour of North Texas.

HOPE SERVICE



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H-29

HOPE

ENGINEERS & CONTRACTORS IN NATURAL GAS AND OIL

HOPE

Say you saw it in The OIL WEEKLY

New Extension and Big Wells Send Panhandle Output Up

Hutchinson and Gray Counties expected to show further increase. Rail spur in

By H. H. KING
Staff Representative

Amarillo, Texas. — New extensions and a series of large producers followed in the wake of the Texas Panhandle district's daily output rising to 152,210 barrels during the past week. The crude production in the district is ascending to a new peak level each week, and a gain of 12,475 barrels was funished last week by Hutchinson and Gray Counties, while further increases are in sight for these two two counties until cold weather places a damper on the field work and retards the movement of oil from flow tanks to field storage and tank car racks.

The Gulf Production Company's E. B. Johnson 11, located in the southeast corner of section 70, block 46, and on a 160-acre lease, proved to be the banner completion for Hutchinson County during the past week. This well was completed Sunday flowing 987 barrels of pipe line oil during the first 22 hour gauge from sandy-lime pay at 2890-92 feet, and when deepened to 2897 feet Tuesday morning increased its flow to 200 barrels per hour natural. This well is the largest producer obtained to-date by Gulf in the Panhandle. The J. K. Hughes Development Company's W. L. Kingsland 8-A, section 6, flowed 2400 barrels initial after being shot with 60 quarts at 2735-95 feet.

The McMan Oil & Gas Company's Johnson-Gray 4, section 21, flowed 30 barrels per hour when drilled one foot in the pay at 2930 feet, and averaged 220 barrels per hour for five hours when deepened to 2938 feet. This well was holding at 135 barrels per hour at last reports, with an unusually heavy gas pressure. Phillips Petroleum Company came in for a share of the big flush production when its Whittenburg-Coble 16 flowed 2000 barrels daily after shot of 100 quarts at 2882-2933 feet, while the Whittenburg-Burg 1 flowed 80 barrels per hour natural at 2925-60 feet.

Santa Fe Spur Opened

The formal opening of the Santa Fe railroad's 30-mile spur line extending from Panhandle to the Isom-Borger area in the heart of the Hutchinson County flush area was made Saturday morning. This lines paves the way for 18 car racks completed and building to help on relieving the over-production of crude in the county, while it also permits the operators to stop trucking their field equipment and general supplies from Panhandle. The same freight rates applying on crude loaded over racks on the main line of the Santa Fe between Amarillo and Pampa will apply on the Isom-Borger extension. However, supplies and heavy equipment moving into the Isom-Borger area will have a slightly higher freight rate than that now applying to Panhandle. The latter rate will amount to about 50 cents per ton higher, or about two cents per 100 pounds on pipe moving in car lots from the Pittsburg district. This rail line will save the oil companies and operators many thousand dollars monthly as heretofore all equipment and material used in the Carson-Hutchinson County field has been trucked from Panhandle, an average distance of 30 miles, at drayage prices ranging from $5 to $8 per ton.

Expect Increase in Work

Field activity in Hutchinson County is expected to show a marked increase on the northwest side of the proven area, and across the Canadian River. The Big Creek Petroleum Company (Prairie's) Cal Merchant 1, section 37, block 47, is spraying 60 barrels oil daily from sandy-lime pay at 2708-10 feet, while waiting for Prairie to build a line to the well. This producer opens up a big scope of territory to the west, and is logging the formations high, as the top of the lime was encountered at 1877 feet with a surface elevation of 2832 feet. Two miles nearer production is a semi-wildcat test being drilled by the Wentz Oil Corporation on the Merchant land, section 34, with 1500 feet of oil in the hole from pay at 2757-65 feet.

The Wilcox-Pampa filed in Gray County is forging to the front as a major source of crude supply, and averaged 7125 barrels daily last week from 23 wells. The Wilcox Oil & Gas Company's Worley-Reynolds 13 flowed 2000 barrels natural from granite wash pay at 2963-76 feet, and No. 14 on the same lease came in spraying 60 barrels per hour with heavy gas flow at 2872-2908 feet, total 2918 feet. The Prairie-Shamrock Petroleum Company et al's Merten and Worley-Reynolds leases have eight tests changing from rotary to standard rigs at the 2400-foot level, and nearly a score of additional tests in the field have reached the standardizing depth.

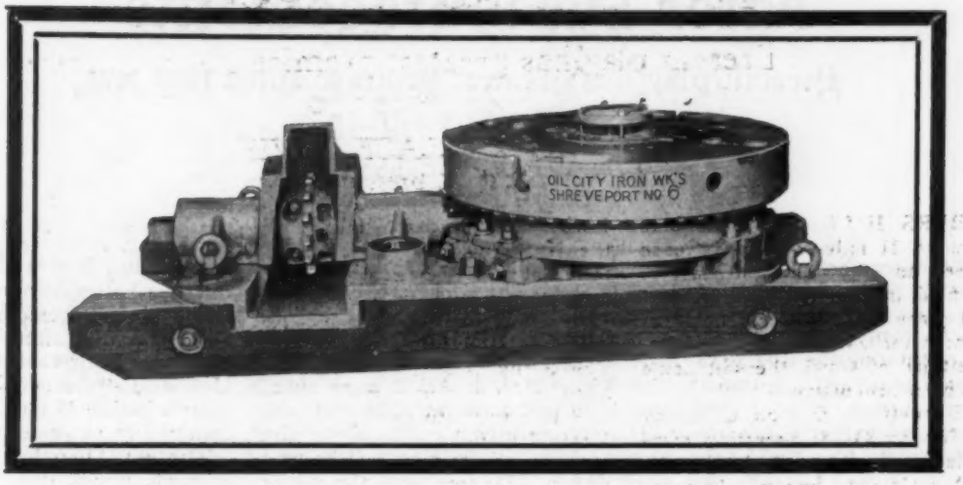
Roxana Makes Purchase

Roxana has purchased the west 80 acres of the northeast quarter of section 175, I. & G. N. survey, block 3, Gray County from R. R. Osborne for a consideration of $50,000, of which one-half was cash. This lease gives Roxana an east offset to Gulf's wildcat producer on the McConnell land, which swabbed 55 barrels Saturday from granite wash pay at 3110-70 feet. Roxana also purchased in fee from W. J. Brown a 75-acre strip on the north end of section 128, block 3, Gray County, and on the north side of the Santa Fe railroad, for $400 cash per acre. Roxana will build a small tank farm and car rack at this point to handle its own production in Carson and Gray Counties. Roxana's wildcat producer on the Bryan land averaged 450 barrels daily during the past week. The Republic Production Company's C. R. Garner 1, in section 103, and four miles west of Roxana's wildcat oil producer, was flowing 50 barrels daily in slush pit early this week from sandy-lime pay at 3050-55 feet, with a total depth of 3138 feet, and will be shot when storage is available.

PANHANDLE OPERATIONS

Amarillo, Texas.—Condensed summary of field operations in the Texas Panhandle district at the close of last week is listed below by counties, with comparative totals for the previous week:

	Completions	Active Tests	Shut Down	Rigs and Derricks	Locations	Totals
Armstrong Co.	..	..	1	..	..	1
Briscoe Co.	..	..	..	..	1	1
Carson Co.	..	23	5	10	5	43
Castro Co.	..	..	..	..	1	1
Childress Co.	..	1	..	..	..	1
Cochran Co.	..	..	..	1	..	1
Collingsworth Co.	..	1	1	1	2	5
Dallam Co.	..	1	1	..	..	2
Deaf Smith Co.	..	..	..	..	2	2
Donley Co.	..	..	1	..	..	1
Gray Co.	7	77	10	12	7	113
Hansford Co.	..	..	2	..	..	2
Hartley Co.	..	4	4	1	1	10
Hemphill Co.	..	2	2	2	1	7
Hockley Co.	..	1	..	..	..	1
Hutchinson Co.	20	218	57	72	32	399
Lamb Co.	..	1	..	..	..	1
Lipscomb Co.	..	2	..	..	..	2
Moore Co.	..	5	7	1	..	13
Ochiltree Co.	..	2	2	1	..	5
Parmer Co.	..	..	..	..	1	1
Potter Co.	1	2	1	2	1	7
Randall Co.	..	1	..	..	..	1
Roberts Co.	..	1	2	2	..	5
Sherman Co.	..	1	1	1	..	3
Swisher Co.	1	..	..	..	1	2
Wheeler Co.	1	9	3	7	2	22
Totals	30	352	100	113	57	652
Totals for previous week	27	356	105	111	53	652



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Say you saw it in The OIL WEEKLY

Barbers Hill Again Getting Consideration After Discouragements

Present play has greatest promise since first test 24 years ago

By WALLACE DAVIS
Staff Representative

BARBERS HILL field, Chambers County, 11 miles north of Goose Creek and 21 miles southeast of Humble field, is assuming an important potential place in Gulf Coast field development after 24 years of exploitation, one-third of which the salt dome pool has been productive.

Mills Bennett Production Company and the Moody Oil Corporation completed the Fee No. 6 well October 10, for 500 barrels pipe line oil, 32 gravity at 3330-48 feet with a strong gas pressure. This well follows several other completions of recent date resulting from a drilling campaign that started early last summer after Mills Bennett and the Humphreys Corporation had opened a new productive area 8000 feet norhtwest of the old pool with a 700 barrel well in the Barber No. 1.

Barbers Hill is showing better possibilities today of entering the class of substantial fields than at any time in its history. Six rigs are running, including three of Mills Bennett Production Company, one of Barkley & Meadows, one of the Humble Oil & Refining Company and one of Patillo Higgins. Production is running around 1200 barrels, more than 1000 barrels of which is owned by Mills Bennett Production Company with its two associates in the field, Humphreys Corporation and the Moody Oil Corporation. The remainder of the production is coming from two producers of Barkley & Meadows, independent operators, who have a 10-acre strip through the center of the newly opened area on the northwest. In and around the new pool the Humphreys Corporation owns an undivided one-half interest in Mills Bennett Production Company's 493 acres of flank frontage with the latter in charge of operations. In the old pool on the south side of the dome the Moody Oil Corporation owns an undivided one-half interest in the Mills Bennett Production Company's acreage with the latter in charge of operations. The choice acreage of the two latter companies in the south pool is in the Japhet 15 acres and the Fee 31.1-acre tract.

Recent Developments

Mills Bennett completed the Barber No. 1, discovery well in the northwest pool, May 18 after the two companies had begun joint operations and the Humphreys Corporation had made a geophysical survey of the section. The Barber No. 2 was a failure and the the No. 3 made a 175 barrel pumper at 2231 feet. The Kirby No. 2 of Mills Bennett, on land owned in fee by the Kirby Petroleum Company, made 660 barrels September 3, from 2204 feet. The Kirby Nos. 1 and 2 were abandoned in the dome at 1584 feet and 3137 feet respectively. The Kirby No. 4 was drilling at the close of the past week below 2400 feet, and the Kirby B-2, located 380 feet east of the B-1 on the east side of the dome, was drilling at 3465 feet, both operated by Mills Bennett Production Company. Location has been made for the Barber No. 5, 225 feet south of the extension discovery well.

Humble Oil and Refining Company has started its Meyers No. 2 on the Meyers 51¼ acres to the north of Mills Bennett-Moody Oil Corporation's Fee tract in the south pool. Barkley & Meadows were drilling at the end of the week at 1920 feet in the Barker No. 3 on their 10-acre strip. Patillo Higgins was drilling at 855 feet in his Fee No. 1 on the southeast side of the dome, an offset to his No. 1, which hit the dome on his 28-acre fee tract.

Barbers Hill first attracted attention in 1889, when E. W. Barber struck inflammable gas while digging a 65-foot water well near his home. The value of the find not being recognized at that time, nothing developed until after Spindletop's discovery in January, 1901, after which it was the first prospective field in the salt dome territory to receive attention.

Higgins Drilled First Well

Patillo Higgins was the first operator at Barbers Hill, and drilled his first test into cap rock at 934 feet on the northwestern slope of the hill. A show of heavy crude was found in this test at 800 feet, and four other wells were drilled by Higgins. Later J. M. Guffey joined Mr. Higgins and they drilled five other wells jointly. Fourteen wells were drilled within the next four years without obtaining production. Owing to the failures and the low price of crude little activity was seen from 1906 to 1916.

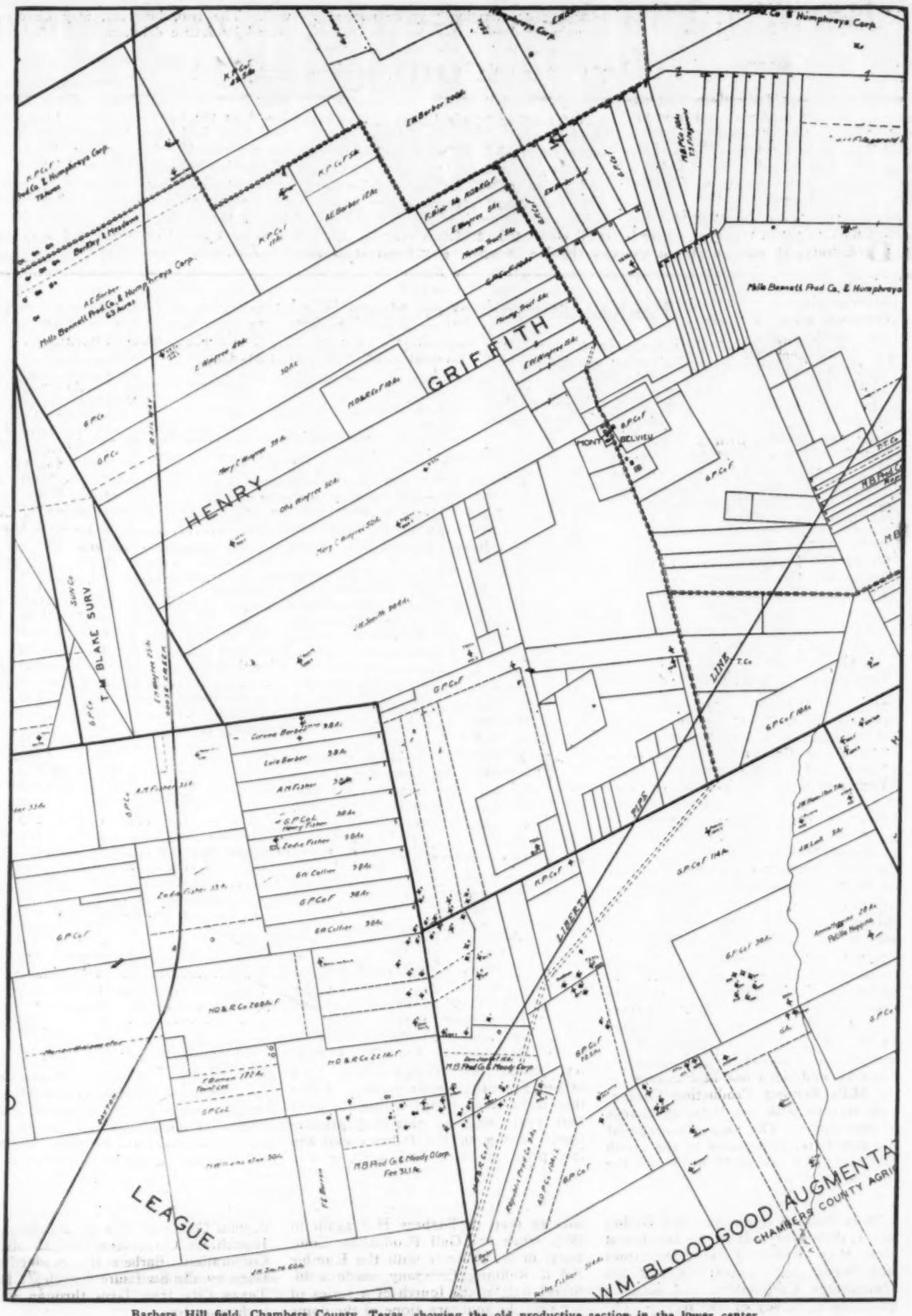
Success in finding pay around the periphery of other domes led operators to turn to Barbers Hill again in 1916, when the Gulf Production Company, drilling jointly with the Humble Oil & Refining Company, made a 40-barrel well in the fourth of a series of tests on the southern slope of the dome from sand at 1571 feet, the field's first production. The well was abandoned, however, after turning to salt water shortly after completion. The first successful well after 16 years of drilling was completed in 1918 by the United Petroleum Company for 70 barrels initial, 23 Baume gravity, which contiued to produce for 15 months.

This well, together with an increase in crude prices, gave rise to many locations, and by the opening of 1919 the daily output was 600 barrels. Berkenstein brought in a 650-barrel well on the Collier tract April 15, 1919, and with other completions of The Texas Company and United Petroleum Company production rose to 1000 barrels by the middle of the year.

The first deep producer from offside sands was completed by the United Petroleum Company in its Barrow No. 1, it flowing 1500 barrels from 3560 feet. This well brought new interest, and the United Petroleum Company, the Humble and Mills Bennett Production Company starting extensive operations brought the field to its peak in October, 1922, a monthly output of 53,800 barrels. The increase was due largely to Mills Bennett Production Company's Japhet No. 1, which made 1800 barrels of 34.5 gravity crude.

In 1923 The Texas Company attemptedto get deep production on the northeastern side of the dome, but failed in three wells, the Scott No. 1 going to 4635 feet without a show of importance. After this work activity fell off in tht field, and in August, 1924, there were only three producers making a combined yield of 150 barrels daily. With exception of this small production the field was practically dormant until the new strike of the Mills Bennett Production Company and Humphreys Oil Corporation in May of this year.

Of 130 wells drilled at Barbers Hill, 34 have been commercial producers, or approximately 26 per cent. The average depth of the holes drilled is 2253 feet, field records show. At the close of the past week the field had produced 993,485 barrels, 89,450 barrels of which was produced since January 1, 1926. Of the production this year 85,825 barrels have been produced by Mills Bennett Production Company with its associated, the Humphreys Corporation and Moody Oil Corporation. Barbers Hill production is taken by the Swiftsure Petroleum to its Texas City tank farm through a six-inch pipe line.



Barbers Hill field, Chambers County, Texas, showing the old productive section in the lower center and the new activity, recently opened, in the upper left.

New Bartlesville Sand Pool Opened In Kansas

Wichita, Kansas.—Indications that another Bartlesville sand pool has been uncovered in Greenwood County are held in the drilling in of the test of T. K. Simmons and Dave Rhoades, No. 1 Luthi in the southeast of the southwest of section 29-22-13, near Lamont.

The Bartlesville was found at 1695 feet and the hole drilled to 1713 feet, where it filled 1400 feet with oil. A shot is expected to make a producer, although swabbing or pumping may be necessary to gain production.

Wells of this sort are typical of the small pools of Greenwood County, which has more than 20 pools, whose combined output is around 45,000 barrels daily.

North of the Winfield pool, T. B. Slick et al in No. 1 Dibbens northwest of the northeast of 22-32-15, has a well spraying oil with gas from sand topped at 2395 feet and drilled to 2406 feet. It will be shot. This well is on State land.

This well is north of the first Winfield well completed early this year by the J. A. Hull Company. Dry holes separate the Slick well from those around the Hull well. The two, however, may be connected by future drilling.

New Lockport Wells

Houston, Texas.—Vacuum Oil Company completed its Bayou D'Inde State No. 1 in the Calcasieu River, Lockport, Louisiana, field early last week for 1500 barrels from 3769 feet, and the Miller No. 10 well for 290 barrels from 5447 feet.

Vacuum's Lockmoore No. 4 at Lockport was drilling October 20 at 6166 feet, a record depth hole for the Mid-Continent and Gulf Coast territory by 139 feet.

Panhandle Production Rises Slightly

Amarillo, Texas—Daily average production in the five counties producing oil in the Texas Ranhandle district for the past week is listed below by companies, with the total producing wells included:

	Number Wells	Average Daily Prod.
Carson County—		
American Refining Company	7	525
Empire Gas & Fuel Co.	1	35
Gates Oil Company	1	10
Gulf Production Company	16	625
Marland Oil Company	12	1,960
Roxana Petroleum Corporation	1	450
W. W. Silk et al	3	115
Skelly Oil Company	2	60
Sunny Jim Oil Company	2	45
The Texas Company	11	260
Totals	56	4,085
Gray County—		
Empire Gas & Fuel Company	1	10
Gulf Production Company	4	2,500
Magnolia Petroleum Company	3	100
McMan Oil & Gas Company	1	460
Prairie-Shamrock Pet. Co. et al	3	1,005
The Texas Company	1	15
Wilcox Oil & Gas Company	9	3,000
Young et al	1	35
Totals	23	7,125
Hutchinson County—		
Alaska Petroleum Company	1	65
Amerada Petroleum Corporation	9	680
American Refining Company	3	600
Apex Oil Company	2	245
Badger Oil Company	2	140
R. G. Barnum et al	1	20
Buffalo Oil Company	1	60
Canadian River Oil Company	5	450
Canyon Oil Company	5	9,000
Center Dome Oil Company	1	..
Cline & Douglas Oil Company	1	10
Coble-Whittenburg Oil Co.	3	1,000
Cockrell-McIlroy Oil Company	4	510
Continental Oil Company	1	15
Currie Bros. & J. R. Phillips	2	..
Delmar Oil Company	1	45
Derby Oil Company	4	1,225
Devonian Oil Company	3	500
Dixon Creek Oil Company	21	6,700
Double Five Oil Company	1	65
E. J. Dunnigan et al	1	800
J. B. Dunnigan et al	2	365
Echo Oil Company	3	1,800
Empire Gas & Fuel Company	7	5,905
Fly-Blackburn Oil Company	2	300
Gates Oil Company	4	385
Goldelline Oil Corp.	3	310
Golding-Phillips Oil Co.	1	10
Gulf Production Company	23	5,115
Gulf-Cline & Panhandle Ref. Co.	36	7,185
W. Scott Heywood et al	2	285
W. H. Holmes et al	1	200
Holmes-Currie & McKnight	3	455
J. K. Hughes Development Co.	15	2,700
Japhet Production Co. et al	3	850
Lenix et al	1	10
Lucky Ten Oil Company	3	705
Marland Oil Company	42	18,875
S. D. & W. W. McIlroy	6	765
McIlroy Oil Company	3	295
McIlroy-Herring Oil Company	4	415
McMan Oil & Gas Company	16	6,905
J. H. Middleton et al	3	70
Mid-West Exploration Co. et al	6	975
Minnehoma Oil Co..& Kistler	1	80
Murchison-Fain Oil Company	1	400
Newby Oil Company	1	90
New Domain Oil & Gas Company	3	150
Pantex Oil Company (Westex)	8	3,650
Pattison-Lenix Oil Company	1	280
J. R. Phillips et al	1	25
J. R. Phillips-Heywood	2	2,700
Phillips Pet. Co. et al	75	29,900
Prairie-Phillips Pet. et al	24	6,100
Relief Oil Company	3	1,240
Henry Riley et al	1	275
Henry Riley & W H. Holmes	2	545
Roxana Petroleum Corporation	8	1,420
Ryan Con. Pet. Corp. (Morton)	3	470
Skelly Oil Company	13	4,800
Skiatex Oil Company	4	1,150
J. L. Smith	2	205
Smith-Bynum et al	2	270
Spring Creek Oil Company	4	910
Summit Oil Company	2	365
Sunburst Oil Company	2	1,345
Sunrise Oil Company	1	5
Sunny Jim Oil Company	5	655
Travelers Oil Company	2	640
Triangle Oil Company	2	2,895
J. D. Ward et al	2	100
White Eagle O. & R. Co. et al	17	3,100
Totals	450	140.575
Potter County—		
Amarillo Oil Company	1	30
Wheeler County—		
Continental Oil Company	2	195
Gibson Oil Corp. et al	2	145
Mid-Kansas O. & G. Company	1	35
Mid-West Exploration Co.	3	20
Totals	8	395
Grand totals for past week	538	152,210
Grand totals for previous week	495	139,735

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BETTER BE SAFE THAN SORRY — GUIBERSON

Say you saw it in The OIL WEEKLY

Six Completions Boost Huntington Townsite Production to 12,800 Barrels

(Continued from page 34.)

Edison No. 9 this week and brought in a 3000 barrel producer from 6231 feet. Stratigraphically the Shell Company's well is deeper than the Associated Oil Company's No. 33 Lloyd, and thus sets a new world record for deep sand production. Petroleum Securities has picked up the oil sand in its Willette No. 1 at 5995 feet and since the deep and more lucrative production in this field comes from the 6000 foot level, the Petroleum Securities Company is scheduled for the early completion of a nice well.

There are 27 drilling wells in various stages of development in the Ventura Avenue field. Sixty-five wells in this area are producing about 52,000 daily, or an average of 800 barrels per well. Eleven new rigs are up. In view of the size of the wells brought in at Ventura Avenue and the status of drilling operation in the field it is possible that the recent prediction that this field would be producing 60,000 barrels by January 1, 1927, may be a bit conservative.

The Marland Oil Company, discoverer of the Seal Beach, California field, is preparing to incresae its production from this area in a few weeks. This company's discovery well, Bixby No. 2, still maintains a daily average of 1800 barrels, while the company is rapidly nearing the producing stratum with its other two wells drilling nearby. Marland's Bixby 3 is drilling at 3900 feet within 300 feet of the oil sand, and the company's Bixby 4 is reported as within 200 feet of the zone, drilling at about 400 feet.

The Standard Oil Company is also making splendid progress with its San Gabriel Improvement No. 1, where it is drilling below 4100 feet. The next few weeks should bring some interesting reports from the local Beach area.

GENE McINTYRE
well known in Mid-Continent fields, who recently joined the sales staff of the W-K-M Company. He was formerly with D. & B. Pump and Supply Company.

Pierce Junction Has Two Completions for Week

Houston, Texas—Interest ran high at Pierce Junction this week after Rio Bravo Oil Company had completed its Fee No. 4 well for 2060 barrels initial, the best well yet opened in the new extension, and Marland Oil Company of Texas had made its first production in the Gulf Coast with a 375-barrel well that extended the west side field 750 feet to the north.

Marland made location October 19 for the Nos. 2, 3 and 4 wells to be drilled on its Prudent Investment Company 50-acre lease. The No. 2 location is 375 feet east of the west line and 50 feet south of the north line of Lot 20, the No. 3, 225 feet east of the west line and 50 feet south of the north line of Lot 20, and the No. 4 located 400 feet east of the west line and 51 feet south of the north line of Lot 34. All three of the new locations are in the B. B. B. & C. Survey.

Rio Bravo's Fee No. 4 came in from a total depth of 3628 feet with 19 feet of rich pay sand. Gravity tested 23.2 Baume. Two days after completion production had showed a slight increase.

Marland's Prudent Investment Company No. 1 is flowing by heads through 6⅝-inch casing from a pay sand at 3678-3709 feet with two joints of 4½-inch screen set. The gravity of this production is 21.6 Baume at 84 degrees.

Fault Line Tests Will Seek Trinity Sand

Mexia, Texas—Three widely separated tests have been started or are rigging up along the East Central Texas fault line to try for production in the Trinity sand, with two of the tests contracted to go to 5500 feet, unless oil or gas is found in commercial quantities. The Sun Oil Company's H. A. Swink 3-A, located in the north Currie field, Navarro County, has reached a depth of 3660 feet with rotary, and will probably standardize shortly and go to 5500 feet, while turnkey contracts have been awarded to George McCamey, Fort Worth, and Farish, Watts & Collins, Houston, to drill to the Trinity formation, or 5500 feet near Mexia and Kosse.

The Sun Oil Company's deep test is being drilled by Cranfill Bros. Drilling Company, Dallas, with the first 3500 feet on turnkey contract, and the remainder of the hole is to be drilled on footage prices. This deep test was spudded August 17, 1926, and only surface casing has been set to date, while the 15-inch hole was carried to about 3500 feet. The drilling crew are in hard Georgetown formation with a 10-inch hole, and a string of 8¼-inch seamless pipe will be set when needed. This pipe was shipped in from California.

C. W. Harrison and the Pandem Oil Corporation are making a deep test on the Bassett farm, near the short lived gusher at Kosse, Limestone County, and let turnkey contract to George McCamey and associates to go to 5500 feet for $80,000. This test has been spudded to 445 feet with machine, and a heavy California type of rotary has been set up to resume operations this week. Acreage sales have been made to finance this test.

The Trinity sand test at Mexia, as mentioned last week, is benig drilled jointly by the E. L. Smith Oil Company, Humble Oil & Refining Company, Magnolia Petroleum Company, J. K. Hughes Development Company and R. L. Wheeleock et al on the Jake Steubenrauch farm, located on the west edge of the Mexia field. These operators have taken a lease on a half-mile strip running parallel with the west line of the producing field, and Farrish, Watts & Collins will drill the test to 5500 feet for $90,000 cash.

Archer Leases Sold

Wichita Falls, Texas—The Plains Production Company has disposed of its producing properties on the J. H. Turbeville and R. O. Prideaux leases in Archer County to the Shappell Oil Company for a cash consideration of $237,500. The Turbeville lease contains 20 acres on the east end of the Simms-Turbeville field, section 171, Robert Carson survey, with three wells making about 1,000 barrels daily, and two tests drilling. These three wells were completed within the past month with initial output ranging from 600 to 850 barrels daily on the swab. The Prideaux lease contains 42 acres, located in the John Dorsey survey, A. 121, wtih four shallow pumpers making about 25 barrels of oil daily.

New Wichita County Pool Indicated

Wichita Falls, Texas.—Southwestern Wichita County gave promise of a new pool early this week when Apple & Brandeberry et al's wildcat test on the G. B. Ancell Ranch drilled through broken oil sand at 1755-59 feet, with a total depth of 1769 feet, with an estimated production of 20 barrels daily. This test filled 1000 feet with oil and some water after drilling through the pay, and will be plugged back to 1762 feet and standardized to pump. It is located on the north line of the northwest quarter of section 10, block 7, centering on the Wichita-Wilbarger County line.

AVERAGE DAILY PRODUCTION FOR U.S.

United States Dai'y Average Production by Weeks

Figures below are taken from the complete revised estimates of the AMERICAN PETROLEUM INSTITUTE except for the current week, which are advance estimates issued by the A. P. I. and are subject to revision.

Week Ending	Oklahoma	Kansas	Texas (Outside Gulf Coast)	Gulf Coast	North Louisiana	Arkansas	Eastern States	Rocky Mountain	California	United States Total
February	450,037	101,937	245,989	91,550	45,090	169,676	99,000	98,412	605,250	1,909,637
March	454,762	103,300	260,262	92,712	48,787	165,312	97,625	102,325	604,500	1,929,562
April	467,175	101,825	263,612	88,812	50,562	159,824	100,875	106,675	600,000	1,947,387
May	463,750	105,690	277,700	94,550	58,150	175,430	105,700	112,300	602,720	1,995,990
June	**456,450**	**107,637**	**302,187**	**89,912**	**60,412**	**167,887**	**106,250**	**112,925**	**606,925**	**2,013,187**
July	456,920	110,320	336,600	114,760	57,460	161,870	104,700	108,520	613,940	2,062,470
August	465,137	111,600	381,580	161,237	56,787	157,375	108,350	110,737	609,725	2,162,662
September	465,387	113,037	402,212	175,512	56,575	154,037	110,125	105,825	598,100	2,180,862
October 2	470,500	115,150	413,250	174,400	58,200	151,100	110,000	101,650	600,000	2,194,250
October 9	474,950	114,800	430,350	167,450	57,900	150,150	109,500	96,600	602,500	2,204,200
Oct. 16	486,150	144,300	443,050	166,750	57,000	149,900	109,000	99,700	608,300	2,234,150
Increase over past week	11,200	.....	12,700	.....	.....	.....	.....	3,100	5,800	29,950
Decrease over past week	.....	500	.....	700	900	250	500	.....	.....	.....

Texas

NORTH TEXAS

	Oct. 16	Oct. 9
Burkburnett	13,600	13,200
Electra	16 600	16,300
Iowa Park	4,050	4,000
Iowa Park K-M-A	4,050	4,000
Wilbarger	13,950	13,850
Hutchinson County	143,050	131,900
Panhandle Misc.	11,600	10.350
Petrolia	700	650
Montague County	7,300	6,850
Archer County	32,700	32,300
Others	800	800
Totals	244,350	230,200

EAST CENTRAL TEXAS

Mexia	11,200	11,200
Currie	750	750
Richland	1,350	1,350
Corsicana-Powell	24,300	24,250
Wortham	6,050	6,050
Nigger Creek	12,250	12,200
Totals	55,900	55,800

WEST CENTRAL TEXAS

Stephens County	10,700	10,800
Eastland County	5,500	5,500
Desdemona	1,700	1,700
Young County	6,950	6,850
Palo Pinto County	400	400
Calahan County	4,150	4,200
Shackelford County	8,850	8,800
Reagan County	29,250	29,100
Brown County	12,950	12,250
Coleman County	1,600	1,650
Crane-Upton Counties	11,000	12,450
Mitchell County	3,650	3,800
Others	2,450	2,800
Totals	99,150	100,300

SOUTHWEST TEXAS

Luling	20,650	20,750
Laredo District	16,850	17,100
Somerset	1,950	1,950
Lytton Springs	3,650	3,650
Piedras Pintas	.....	50
Others	500	550
Totals	43,650	44,050
Tot'l Tex. (outside Gulf Coast)	443,050	430,350

GULF COAST

Goose Creek	7,500	9,950
Hull	22,650	21,450
Saratoga	1,450	1,150
Blue Ridge	1,950	1,600
Damon Mound	850	850
Batson	1,600	1,600
West Columbia	8,900	8,850
Humble	3,750	3,850
Pierce Junction	3,600	2,100
Sour Lake	7,550	8,700
Spindletop	78,900	79,800
Orange County	6,700	7,150
Edgerly	1,000	1,000
Evangeline	1,050	1,050
Vinton	6,000	6,000
Lockport	4,150	2,900
South Liberty	4,050	4,500
Big Creek	1,300	1,300
Boling	2 150	2,400
Others	1,650	1,700
Totals	166,750	167,450

Oklahoma

North Braman	14,800	15,150
South Braman	6,750	6 800
Blackwell	3,900	4,150
Hubbard	2,650	2,800
Thomas	1,800	1,950
Tonkawa	36,350	36,900
Garber	25,000	26.100
Burbank	49,150	46,800
Osage (outside Burbank	34,400	34,500
Watchorn	4,150	4,150
Cushing	21,450	21,500
Yale Jennings	13,750	13,800
Davenport	5,400	5,250
Bristow Slick	27,150	27,300
North Okmulgee	17,450	17,550
Lyons Deaner	3,950	2,950
Stroud	2,000	2,000
Cromwell	15,100	15.300
Papoose	9,500	9,550
Wewoka	26,950	27,050
Duncan District	7,400	7.400
Graham	10,600	10,400
Fox	6,500	6,250
Healdton	14,950	14,700
Hewitt	11,150	11,200
Seminole	47,200	34,950
Others	66,700	67,500
Totals	486,150	474,950

California

Santa Fe Springs	47,500	47,500
Long Beach	95,000	93,500
Huntington Beach	53,000	50,000
Torrance	27,000	27,000
Dominguez	21,000	21,000
Rosecrans	13,000	13,000
Inglewood	41,000	41,000
Midway-Sunset	94,000	94,000
Ventura Avenue	48,800	50,500
Others	168,000	165,000
Totals	608,300	602,000

North Louisiana

Homer	5,550	5,600
Haynesville	9,150	9,200
Caddo Light	9,800	9,750
Caddo Heavy	2,800	2,450
Desoto Red River	4,050	4,000
Elm Grove	550	500
Bellevue	2,050	2,100
Cotton Valley	7,600	7,600
Urania	15,450	16,700
Totals	57,000	57,900

Kansas

	Oct. 16	Oct. 9
Florence Covert	1,950	1,950
Peabody Elbing	4,150	4,200
Eldorado Towanda	13,750	13,750
Augusta Fox-Bush	5,000	4,900
Rainbow Bend	3,400	4,500
Russell	4,500	4,500
Greenwood County	44,200	44,950
Others	37,350	37,050
Totals	114,300	114,800

Arkansas

El Dorado	6,950	6,850
Smackover Light	14,000	14,150
Smackover Heavy	117,850	117,850
Stephens	1,600	1,600
Nevada	1,850	1,900
Lisbon	7,650	7,800
Totals	149,900	150,150

Mountain States

WYOMING

Salt Creek	45,900	43,150
Grass Creek	3,100	3,100
Elk Basin	800	800
Big Muddy	3,300	3,300
Lost Soldier	5,150	5,050
Rock River	2,750	2,600
Hamilton Dome	.....	1,200
Teapot Dome	1,050	250
Lance Creek	1,050	1,050
Others	2,150	2,350
Totals	65,250	62,850

MONTANA

Cat Creek	2,600	2,650
Sunburst	18,000	18,000
Others	200	200
Totals	20,800	20,850

COLORADO

Moffats (Craige)	3,100	3,500
Fort Collins	3,550	3,350
Florence	450	500
Others	800	750
Totals	7,900	8,100

NEW MEXICO

Table Mesa	700	.....
Artesia	3,000	3,000
Hogback	750	750
Rattlesnake	1,300	1,050
Totals	5,750	4,800
Total Mountain States	99,700	96,600

EASTERN STATES

(Including Ill., Ind., Ohio, Pa., W. Va., Ky., and N. Y.)	109,000	109,500

PRODUCTION SUMMARY

East of Rockies	1,526,150	1,505,100
United States	2,234,150	2,204,200

COMPLETIONS FOR PAST WEEK IN U.S. FIELDS

Summarized Review of Field Results

State—	Completions This Week	Completions Last Week	Producers This Week	Producers Last Week	Gas Wells This Week	Gas Wells Last Week	Failures This Week	Failures Last Week	Initial Production This Week	Initial Production Last Week
Arkansas	24	11	19	8	1	..	4	3	1,275	665
California	23	14	22	10	..	..	1	4	4,981	3,132
Colorado	..	..	..	..	..	..	..	..	.....	.....
Indiana	10	7	4	4	3	..	3	3	95	131
Illinois	6	17	6	11	..	..	..	6	12	192
Kansas	16	34	7	19	..	..	9	15	710	5,800
Kentucky	27	21	20	16	2	1	5	4	180	150
Louisiana	25	23	10	7	2	4	13	12	2,455	1,085
Michigan	5	2	5	2	..	..	..	..	128	40
Mississippi	..	..	..	..	..	..	..	..	.....	.....
Montana	11	6	6	4	..	..	5	2	170	110
New York	10	13	10	13	..	..	..	..	32	58
New Mexico	..	..	..	..	..	..	..	..	.....	.....
Ohio	40	62	76	38	8	15	6	9	357	1,002
Oklahoma	87	72	50	41	5	2	32	29	9,213	20,540
Pennsylvania	72	66	63	53	6	10	3	3	706	1,181
Tennessee	3	..	3	..	..	..	..	..	400	.....
Texas	211	172	136	128	9	6	66	38	56,445	50,419
Utah	..	..	..	..	..	..	..	..	.....	.....
West Virginia	34	22	9	8	16	11	9	3	76	.....
Wyoming	19	2	18	2	..	..	1	..	1,850	235
Total	623	544	414	364	52	49	157	131	78,955	84,776

Texas

GULF COAST

Company, Well and Location	Initial Production Bbls.	Depth
Spindletop—		
Gulf Production Co. Jas. F. Weed 2A, wo	3500	3325
Oakwood Realty Co. 6	4000	3000
Jack & Duff 5	2000	3350
Jas F. Weed 7A	5000	3300
Deep Sand Oil Co. Rush 2	150	3275
The Sun Company Price 1	95	3475
Batson—		
East Batson Oil Co. Counzelman 9	6	800
Ada Belle O. Co. Fee 110	60	1050
Gulf Prod. Co. Choate 64	125	1050
Goose Creek—		
Gulf Production Co. Stateland Oil Co. 10, wo	500	3525
Gulf Coast Oil Corp. Gaillard 21A, wo	100	2775
Sour Lake—		
Gulf Prod. Co. C. L. Jackson 1	805	3750
Humphreys Oil Corp. Bashara 4B	550	4060
Hull—		
Gulf Prod. Phoenix Dev. Co. 62, wo	*	3400
Phoenix Dev. Co. 5, wo	160	3325
Republic Prod. Co. Dolbear 39, wo	400	2000
South Liberty—		
Peer Oil Co. Harrison 1, wo	*	3250
Premium Oil Co. Mitchell 1	*	4275
Pierce Junction—		
Joe Bashara Bender 2, wo	800	3740
Navarro Oil Co. Humble 1	244	3530
Orange—		
Gulf Prod. Co. McGuire 1, wo	*	3460
Humble Oil and Ref. Co. Winfree 2, wo	100	3575

CLAY COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Lone Star Gas Co.'s Holloway 23	20	1742
Waggoner 28	4	1871
Waggoner 29	5	1837
Waggoner 30	*	1867

COOKE COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
John W. Hooser's H. L. Dennis 1	20	1328
C. C. Lanier's A. Hyman 6	35	1291
A. Hyman 7	20	1322
McElreath-Suggett et al's Cook 1	*	1888
Sun Oil Co.'s A. Hyman 5	45	1266

MONTAGUE COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Arco Oil Co.'s Howard 3	*	1200
Farlan Oil Co.'s Maddox 4	60	890
F-H-E Oil Co. et al's Howard 1	3	2115
Gulf Prod. Co.'s Howard 3	30	1168
Humble O. & R. Co.'s Maddox 9	35	890
Maddox 10	60	885
Olean Oil Co.'s Maddox 7	50	865
Pure Oil Co.'s Rowland 1-B	100	1106
The Texas Co.'s Oldham 28	35	1112
Texhoma (Continental) Oil Co.'s Rowland 13	35	1178
Salmon 2	*	1584

ARCHER COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Atlantic Oil Prod. Co.'s Oldham 7	*	1350
Bridwell-Heydrick Oil Co.'s Abercrombie-Taylor 1-B	*	1310
Lester T. Burns et al's Turbeville 2	700	1523
Continental & Staniforth's K. & K. 9, (Blk. 63)	75	1793
Gates et al's Thomas 14	60	1167
Thomas 16	70	1173
Gulf Prod. Co.'s S. N. Melugin 1	*	1603
K. & K. 2-C	95	1800
H. J. Heartwell et al's Wilson 1	*	1645
T. F. Hunter et al's Wilson 1	100	1648
Jeffers & Newby's Andrews 2-B	*	973
Magnolia Pet. Co.'s I. C. Little 9	40	1281
Marland Oil Co.'s Turbeville 7	600	1525
Marland-Bass & Dillard's Perkins et al 1	35	1767
Marland-Kentucky Oil Corp.'s White 2	15	1168
Mid-Kansas O. & G. Co.'s Andrews 4	*	1627
Pandem Oil Corp.'s Thomas 9	*	1478
Petroleum Prod. Co.'s Turbeville 2	900	1523
Turbeville 3	1820	1524
Roxana Pet. Corp.'s Abercrombie-Taylor 6	110	1353
Shappell Oil Co.'s Yeatts et al 1	*	1875
Turbeville (was Plains) 2	400	1523
Simms Oil Co.'s Turbeville 9-A	930	1527
Simms & L. T. Burns' Turbeville 1-A	230	1504
The Texas Co.'s Turbeville 10-C	1170	1526
Turbeville 11-C	725	1524
The Texas Co. and Harry Hines' Thom 1	*	1910
Wanderer Oil Co. & Perkins-Cullum's Turbeville 2	100	1504

BIG LAKE

Company, Well and Location	Initial Production Bbls.	Depth
Texon Oil & Land Co.'s University 53	70	2990
University 5-A	100	2885

BROWN COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Berryman et al's McClanahan 1	*	1143
Choate-Henshaw et al's Lowe 1	500	1316
Humble O. & R. Co.'s Wooldridge 2	250	1273
Wooldridge 3	150	1264
Hurley Oil Co.'s Perry 1	*	2180
Kone Prod. Co.'s Foster 6	100	1225
Jas. A. McKanna et al's Foster 7	100	1186
Foster 11	125	1220
Foster 12	100	1210
McLester Oil Co.'s Josie Wooldridge	300	1271
Magnolia Pet. Co.'s M. E. Fry 2	60	1324
Sawyer-Gibson et al's White 2	85	1241
T. B. Slick et al's Newton 2	15	2975
West & H-Y Oil Co.'s Newton 15	50	1237
Newton 18	*	1260
Wilhausen et al's Bourn 1	*	1410
Williams et al's Lawson 1	*	1332
Wilson et al's Stone 1	50	1244

BURKBURNETT

Company, Well and Location	Initial Production Bbls.	Depth
Bridwell-Heydrick Oil Co.'s Ward-Todd 11	300	1878
R. R. Clark-Campbell et al's Ward-Todd 1-E	150	1879
R. R. Clark-Waggoner-Hammond's Ward-Todd 1, dd	100	1882
Ward-Todd 2	100	1903
Holman Cook-Reeder et al's Overby 1	10	491
Overby 2	10	490
Craig-Wilson et al's Hobson 3	*	1861
Skelly Oil Co.'s Ramming 7	20	1596
Ramming 14	1	1679

COLEMAN COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Schermerhorn et al's Gray 1	*	2712

EASTLAND COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Corzelius Bros. et al's Norris 1	*	3305
Gulf Prod. Co.'s H. P. Ferrell 1	*	2266

ELECTRA

Company, Well and Location	Initial Production Bbls.	Depth
Magnolia Pet. Co.'s W. R. Piper 51	*	2055

GRAY COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Gulf Production Co.'s P. A. Worley 5	1140	2936
A. Holmes 1, shot	65	3176
Pure Oil Co.'s Benton 1, shot	150	3149
Wilcox Oil & Gas Co.'s Worley-Reynolds 9, shot	250	3020
Worley-Reynolds 10, shot twice	140	3100
Worley-Reynolds 13	2040	2876
Worley-Reynolds 14	2000	2918

HUTCHINSON COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Devonian Oil Co.'s Johnson 1-A, shot	60	2929

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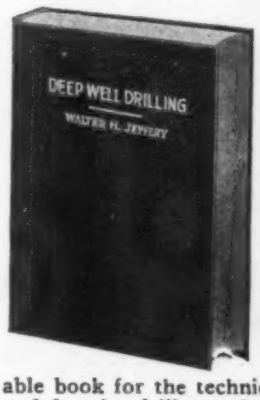

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SULCO PRODUCTS

Constructive and Protective Compounds

Company, Well and Location	Initial Production Bbls.	Depth
Goldelline Oil Corp.'s J. A. Whittenburg 2-B	20	3086
Japhet Prod. Co. et al's Smith 4, shot	400	2782
Gulf Prod. Co.'s E. B. Johnson 5, shot	60	2910
E. B. Johnson 11	1050	2892
Gulf-Cline-Panhandle Ref. Co.'s Dial 29	†	475
Dial 30	800	2975
Marland Oil Co.'s J. F. Weatherly 4-B, shot	100	3043
J. A. Whittenburg 12-A, shot	560	2991
S. D. McIlroy's Smith 3, shot	1475	3038
McMan Oil & Gas Co.'s Smith 7, shot	720	2772
Pantex (was Westex) Oil Co.'s J. A. Whittenburg 9, shot	1500	2955
Phillips Pet. Co.'s Johnson-Montford 1	10	2861
J. J. Perkins-Martin 1, shot	300	2903
J. J. Perkins-Martin 3, shot	210	2953
J. A. Whittenburg-Burg 1	1560	2960
Prairie & Phillips Pet. Co.'s Johnson 21-A	400	3080
Johnson 3-B	1000	2917
Skelly Oil Co.'s Johnson (Sec. 20) 2	2050	2965
White Eagle O. & R. Co. et al's Johnson 3	†	800

JACK COUNTY

Burk-Greis et al's Loving 1	*	2601
Watchorn Oil & Gas Co.'s Carpenter 1	*	3199

K-M-A AND IOWA PARK

Magnolia Pet. Co.'s S. S. Fassett 3	10	1367
W. C. Young et al's Logan 1	*	1803

MILLS COUNTY

Bowers et al's Ratliff 1	*	1275

NIGGER CREEK

Transcontinental Oil Co.'s Cochrum 2	*	2862
Cochrum 3	*	2839
Cogdell 5	250	2817
Cogdell 7	425	2835
Erskine 2	*	2825
T. D. Ross 2	*	2890
A. E. Rosson 11	215	2835
A. E. Rosson 9-A	*	2846
A. E. Rosson 15-A	*	2850

PALO PINTO COUNTY

Owens et al's Gilbert 1	¶4½	3843

SHACKELFORD COUNTY

Albany Oil Co.'s Moberly 9	40	1205
Coogan et al's Nail 1	*	1715
Haile-Knight Oil Corp.'s Reynolds 1	*	1545
Hughes et al's Diller Bros. 1	*	1531
Humble O. & R. Co.'s W. I. Cook 9	200	1370
Marland Oil Co.'s Matthews 1	*	1350
Roberts Oil Corp.'s Matthews 1	*	1528
Roesser-Pendleton, Inc.'s W. I. Cook 9-B (Sec. 60)	*	1228
W. I. Cook 10-B (Sec. 60)	*	1210
W. I. Cook 11-B (Sec. 60)	25	1220
W. I. Cook 17-B (Sec. 85)	20	1219
Roeser-Pendleton & Marland's W. I. Cook 32-A, (Sec. 84)	140	1345
W. I. Cook 17-A, (Sec. 85)	100	1293
W. I. Cook 1-A, (Sec. 116)	*	2001

SOUTH VERNON DISTRICT

Barkley-Meadows et al's Stephens 14-A	25	2060
Murchison-Fain Oil Co.'s W. T. Waggoner 1-E	120	1992

STEPHENS COUNTY

Humble O. & R. Co.'s Hart 6	¶½-10	3281
Jones et al's Swenson 32	*	2300
Phillips Pet. Co.'s Akin 4	20	3350

UPTON COUNTY

Dixie Oil Co.'s Ed. S. Hughes 6	290	2181
Ed. S. Hughes 7	700	2055
Marland Oil Co.'s A. S. Burleson 33	445	2167
A. S. Burelson 3-A	50	2195
The Texas Co.'s R. King 9	3600	2150
A. S. Burleson 1	200	2189

WHEELER COUNTY

Gibson Oil Corp. et al's W. E. Bentley 1	¶30	2265

YOUNG COUNTY

Company, Well and Location	Initial Production Bbls.	Depth
Atlantic Oil Prod. Co.'s Rachuig 10-B	15	1068
Bridwell-Mayfield et al's Williams 8	*	661
Long et al's McCaghren 5	*	959
Madden-Hunt et al's Benson 10	*	917
McMillen et al's Prideaux 4	*	600
Nance & Lucas et al's Boozer 2	50	2190
Navarro Oil Co.'s Dunagan 2	*	1103
Pitzer-West et al's Burgess 5	*	2228
Roberts Oil Corp. & Ruff's Stewart 8	60	834
Simms-Casden & Consolidated Oil Co.'s Gregg 4	*	502
The Texas Co.'s Beardon 18	130	1085
Stewart 3	20	822
Tidal Oil Co. et al's Benson 17-A	*	928
Benson 20-A	*	930

Louisiana

Bellevue Field, Bossier Parish—		
Olmstead et al Strange 10, 23-19-11	*	380
Caddo Parish—		
Gulf Ref. Co. Ferry Lake 254, 22-20-16	35	2275
Magnolia Pet. Co. Spell 1, 29-21-15	*	3553
The Texas Co. Caddo Mineral Lands 40, 23-21-15	*	2321
Unity Pet. Co. Crystal 4, 24-21-16	*	1084
Total, 4 wells	35	
Cotton Valley Field, Webster Parish—		
Humble O. & R. Co. R. R. Cox 2, 22-21-10	¶5	4398
Monroe Gas Field, Ouachita Parish—		
Central Company, Inc., Kerr 2, 12-19-4e	¶1½	2182
Urania Field, LaSalle Parish—		
Catalina Oil Co. Urania Lumber Co. 2, 8-10-2e	50	1539
H. L. Hunt Griswold 4 2-9-1e	50	1504
Keen & Woolf Griswold 2, 3-9-1e	50	1509
Natural Gas & Fuel Corp. Urania Lumber Co. M-5, 20-10-2e	20	1588
Urania Lumber Co. M-8, 20-10-2e	*	1589
Pima Oil Corp. Urania Lumber Co. 8, 7-10-2e	*	1531
Sherman et al Russell 4, 25-10-1e	*	101
Shreveport Oil Corp. Pendarvis 2, 26-10-1e	60	1516
Urania Field, Winn Parish		
Allen et al Allen 2, 23-10-1e	150	1513
Total, 9 wells	380	

Arkansas

Smackover Field, Ouachita County—		
Gulf Ref. Co. Goodwin 12, 32-15-15	150	2380
Umstead A-22, 33-15-15	100	2368
Lion O. & R. Co. Hays 5, 4-16-15	100	2348
Phillips Pet. Co. Joyce 16, 33-15-15	¶30	....
Standard Oil Co. Joyce B-7, 32-15-15	100	2593
The Texas Co. Neeley 7, 27-15-16	45	2255
Smackover Field, Union County—		
E. C. Ferguson's Howard 2, 7-16-16	*	2662
Lion O. & R. Co. Graves 10,3-16-15	110	2673
Simms Oil Co. Cook 12,16-16-15	50	2638
H. O. Murphy 1, 33-16-16	15	2106
Sunny Jim Oil Co. Flenniken 3, 9-9-16-15	10	2486
The Texas Co. Calloway 8, 4-16-15	350	2364
Total, 12 wells	¶30	1030
Lisbon Field, Union County—		
Humble O. & R. Co. Sydnor 3, 21-17-16	20	2128
Imperial O. & G. Co. Goodwin 1, 26-17-16	*	3112
Parker 2, 21-17-16	15	2159
Parker 3, 21-17-16	10	2191
Ohio Oil Co.'s Stock 3, 21-17-16	35	2147
Reynolds & Marr Goodwin 4, 21-17-16	10	2150
Rovenger Oil Corp. Dumas 3, 9-17-16	20	2106
Unity Pet. Co. Sydnor 1, 21-17-16	35	2141
Sydnor 2, 21-17-16	25	2160
Sydnor 3, 21-17-16	25	2150
Total, 10 wells	195	

EAST TEXAS

Panola County—		
L. F. Bahan's Hill 1, Benson Laurel, H/R sur	*	1085
Magnolia Pet. Co. Ida Tiller 3, E. F. Mitcheson, H/R Survey	¶1	1972
Total, 2 wells	¶1	

Oklahoma

Caddo County—		
Magnolia Pet. Co. Pawkune 6, Sec NE NE 10-5-9-w	30	2338
English Drlg. Co. Starkweather 1, SW SE NE SW 31-6-9w	*	2365
Carter County—		
Humble Oil Co. Bumpass 3, NWc SE SE 33-1s-3w	455	3168
Schermorhorn Oil Co., Calvery 1, NWc SE 2-2s-3w	96	3024
Coline Oil Co. Higgins 7, Sec NE 7-2s12w	¶5	2198
Magnolia Pet. Co. Cox 3, NE NW SW 15-2s-2w	15	1395
Amerada Pet. Corp. Baptiste 27, C N L SE NE SE 20-5s-1e	148	1278
Creek County—		
Magnolia Pet. Co. Wiley 1, SWc SE SE 9-17-7e	7	2828
Mid-Continent Pet. Co. Stewart 3 Sec SW 15-17-7e	10	2890
Mid-Continent Pet. Corp Stewart 27, NWc SW SE 15-17-7e	18	2926
Tidal Oil Co. Fife 4, C S L NE NW 22-17-7e	11	2917
Olean Pet Co., Roberts 7, Swc NW NE 5-16-9e	15	2335
Gypsy Oil Co. Richards 15 SW NW SE NW 1-18-11e	700	2091
Riverland Oil Co. Land 3, SE NE SW NW 1-18-11e	650	2103
Sheridan Oil Co. Sherrill 3, SEc NW NW NW 2-18-11e	30	2238
Wilcox Oil & Gas Co. Lindsey 3 SWc NE NE 10-17-9e	100	2077
McCulloch Oil Co. Joconton 1, C S L SW SE 13-17-10e	25	2493
Lover and Meyers Hendrickson 1-A NE SE NW 21-16-9e	150	3017
Wilcox & Oswalt Anthis 6, C NE SW 1-16-11e	50	2693
Mannford Development Co. Walker 1, SEc NW SW 3-19-8	*	3145
McCulloch Oil Co. Lively 1-A, SWc 4-18-11e	*	2525
C. G. Tibbins Yellowhead 9, SWc NE 9-18-2e	*	2087
Gypsy Oil Co. Pittman 37, NEc SE 7-17-12e	*	2563
Erwin et al Ponse 1, SWc NE SE 20-16-11e	*	2858
Garfield County—		
Mid-Continent Pet. Co. and Marland Oil Co., school land 46, NE NW NE SE 13-22-4	214	3040
Roxana Pet. Corp Schroeder 9-T, SE SW 16-22-3w	305	3632
Grady County—		
Gent & Arrowsmith Thomas 1-A, NE SEn NW NE 19-5n-7w	30	1974
Magnolia Pet. Co. Cochran 2, NWc SW SE 27-3n-5w	14	1685
Carter Oil Co. Sham 1, SWc NW 35-3n-5w	41	1443
Kay County—		
Comar Oil Co. Day 2, SEc NE SE 20-29-1w	1362	3370
Wentz Oil Copr school land 2, NWc SW 16-29-1e	43	3410
Wentz Oil Corp Mahoney 13, NWc NE SE 28-25-1e	114	4263
T. B. Slick Endicott 7 SWc SE SW 35-25-1w	130	4083
Marland Oil Co. Kaney 1 NWc SW NW 7-26-1w	*	1885
Okfuskee County—		
Carter Oil Co. Barnett 2, SEc SW NE 25-11-11e	¶3	3487
Prairie Oil & Gas Co. Collins 1, SEc SW 26-11-9e	*	3984
Okmulgee County—		
D. D. Mickelson Lewis 2, C E L SE SE 4-15-11e	10	1925
Future Development Co. and Transcontinental Oil Co. Beams 2, SEc 4-15-14e	100	1623
E. Beard, Trustee, Corbray 15, C E½ NW 23-14-14e	5	1057

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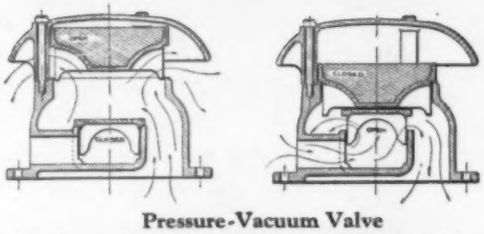
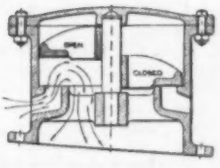


Pressure-Vacuum Valve

Aluminum poppet valve regularly supplied for pressures slightly above atmospheric, or for higher pressures. Can be supplied with pipe outlet when specified.

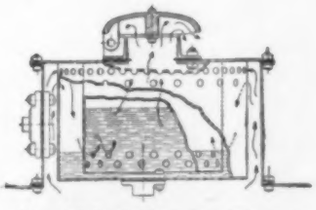
Manifolds

For connecting several wells to one tank. Made with 2, 4, or 6 openings 2", 3", or 4" pipe.



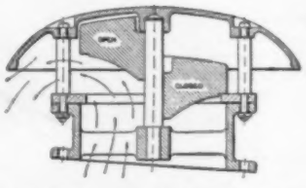
Vacuum Breaker

For installation on tanks connected with a vacuum line. Arrows indicate flow of air when relieving vacuum.



Liquid Seal Pressure Gauge

No weights, valves, or moving parts. Action releasing vapors indicated by arrows; when relieving vacuum action is reversed.



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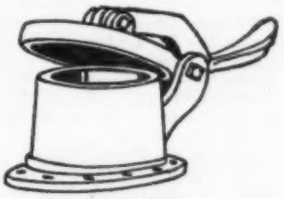
Self-Clamping Gauge Hole Cover

The weighted handle is so linked to the gasket-lined lid that a leak-proof joint is assured when handle is down.



Foot Lever Type Gauge Hole Cover

Lid raises by pressure of foot, and when released makes a vapor-tight joint with body of the cover.

The PARKERSBURG RIG & REEL COMPANY

Main Office and Works: Parkersburg, W. Va. New York Office: 30 Church St.

California Representatives, BUCK & STODDARD

485 California St., San Francisco, Calif.; Box 720 Arcade Station, Los Angeles, Calif.

District Offices and Distributing Warehouses from which Parkersburg Service is available

OKLAHOMA
*Tulsa
Eristow
Drumright
Hominy
Holdenville
Okemah
Tonkawa
Wilson
Shidler
Wetumka
Wewoka

ARKANSAS
*El Dorado
Louann
Sackover

KANSAS
Elderado
Madison

WEST VIRGINIA
Parkersburg
Clarksburg

COLORADO
Denver

LOUISIANA
*Shreveport
Cotton Valley
West Lake

TEXAS
*Houston
Best
Breckenridge
Corsicana
Dale
Liberty
Orange
Panhandle
Ranger
Wichita Falls

WYOMING
*Casper
†Rawlins

MONTANA
††Kevin

NEW MEXICO
Artesia

*District Offices †Frick-Reid Supply Co. ††Great Northern Tool & Supply Company

Company, Well and Location	Initial Production Bbls.	Depth
Lambert, Lowery 1 C N L SW NE 24-16-14e	*	2664
Radcliff Oil Co. Roberts 1-A, NWc SW 33-13-11e	*	3904
E. B. Grubbs Brown 1 NWc SE 7-15-14e	*	2753
Custer Oil Co. Perryman 8, NEc SE SE 19-15-14e	*	1663
Osage County—		
Petroleum D lg. Co. No. 19, NWc NE NE NW 25-26-6e	¶1½	654
Lewis O. Co. No. 4, NW SE NC 8e	300	2497
Skelly Oil Co. and Moore No. 3, NW SW SE 35-22-8e	50	2403
Sophie Nadle No. 10, SWc NE SW SE 18-22-11e	20	1792
Tidal Oil Co. No. 9, SEc SW SW 15-21-12e	20	1243
Tidal Oil Co. No. 4, NE NW NW 22-21-12e	12	1338
Oklahoma N. & G. Co. No. 715, C E L NW 20-21-12e	*	1820
Prairie O. & G. Co. No. 1, SEc NE 10-27-6e	*	3365
Pawnee County—		
Sheltz et al Martin 3, NW SW NE 7-20-8e	50	2579
Sinclair O. & G. Co. Brentenall 17, NWc SW NE 10-20-8e	165	2593
Sinclair O. & G. Co. Mullendore 11, SW NW NE 10-20-8e	30	2605
Industrial O. & G. Co. Fender 1, SWc NE NE 13-20-9e	30	2730
Prairie O. & G. Co. John McNeal 7, NEc SE NW 10-20-8e	40	2805
Payne County—		
Marland Oil Co. and Mid-Continent Oil Co., school land 1, NEc SW 33-20-5e	409	3738
Deep Rock O. & G. Co. Boyles 4, SWc SE 23-18-3e	10	3768
Deep O. & G. Co. Barth 5, SWc NW NE 26-18-3e	175	4300
Seminole County—		
Carter Oil Co. Carter 1, SWc NW NE 24-9-6e	1497	4171
Southwestern Pet. Co. Peters 3, SWc NW NE 24-9-6e	50	3319
Prairie O. & G. Co. Kinkade 3, SEc 33-10-6e	1160	4119
T. B. Slick Jackson 3, NEc NW SW 14-8-7e	*	3501
T. B. Slick Jackson 4, NWc NE SW 14-8-7e	*	4538
Dixie Oil Co. Long 4, SWc NE NE SE 32-8-8e	*	4200
Independent O. & G. Co. and Continental Oil Co. Long 2, SEc NW SE 32-8-8e	*	4214
Independent O. & G. Co. and Continental Oil Co. Long 3, SWc NW SE 32-8-8e	*	4210
Stephens County—		
Carter Oil Co. Graham 1, SWc NW NE 2-2n-5w	27	1489
Gypsy Oil Co. Brown 5, SEc NE SW 24-1n-9w	¶½	2276
Harry Hanbury Warner 1 SE SW NW NE 22-1s-8w	20	2220
Beard & Cobb Skelly-Brigham 2 SEc SW SW SW 30-1s-8w	25	1998
Malernee and Dunlap Brittoan 2, C NW SW 20-1s-8w	*	2103
Safety First Oil Co. Brittian 8, NW NE SW 20-1s-8w	*	2050
Garvin Drlg. Co. Marrey 1, SWc 30-1s-8w	*	....
Tulsa County—		
Superior Oil Co. and Swift, Burnett 1-A, NEc NW NW 7-19-10	160	2033
Commercial Drlg. Co. Littleton 5, NWc SE 19-19-11e	85	1984
The Texas Co., Buck 1, SWc NE NE 7-16-14e	¶8	1449
Munn Brothers Franklin 2, SWc 36-19-11e	*	2320
Wagoner County—		
Mission Oil Co. and F. A. Isett Nave 1, SE NE SE 19-16-19	*	1045
Tillman County—		
S. C. Canary and Barnsdall Dixon 1, C NW SE 8-4s-18w	*	2722
Hughes County—		
Roxana Pet. Co. Barnett 1, SWc NE 24-9-10e	*	4106
Jefferson County—		
Gypsy Oil Co., Seay 8, NWc SE NE 33-6s-5w	*	2045
Muskogee County—		
D. C. Lempton Shenada 1, C NW SE SW 3-11-20e	*	2016
Atoka County—		
Hanson et al Dabney 1, C SE NE 17-4s-11e	*	4012
Comanche County—		
Continental Oil Co. Indian 2, SWc NW SE 30-2n-9w	*	....
Magnolia Pet. Co. Hardy 2, SWc 30-2n-9w	*	3150
McBee & Heacock Johns 1, NWc NE 21-1s-10w	*	2427

Kansas

Company, Well and Location	Initial Production Bbls.	Depth
Butler County—		
Mid-Kansas O. & G. Co. Harris 3, NEc SE NE 22-27-7e	40	2726
Gled Oil Co. Steinhoff 2, C NE 28-29-6e	25	2255
Phillips Pet. Co. Reynolds 2, SEc SW NW 16-27-6e	*	3161
Chautauqua County—		
Prairie O. & G. Co. Deman & Ewers 7 NWc SE 8-24-11e	40	1422
Greenwood County—		
Empire G. & F. Co. Atyeo 12, NWc NE SW 6-22-10e	20	2299
Skelly Oil Co. Green 4, SEc NE NE 15-23-9	160	2352
Theta Oil Co. Rockhill 1, NWc 31-24-11e	225	1867
The Texas Co. Fankhauser 3, SEc NW NE 4-22-12e	*	1863
McGinnis & Manhattan Oil Co. Mock 1, NEc NW NE 36-24-10	*	....
Manhattan Oil Corp. Jocoby 1, NWc 17-24-11e	*	2110
York State Oil Co. Eline 1, SEc 15-25-10e	*	....
Cornelius et al Erickson 1, SEc SW NE 31-25-10e	*	....
Rice County—		
Phillips Pet. Co. Harder 1, SWc SE NW 55-20-6	200	3478
Kingman County—		
Phillips Pet. Co. Hemple 1, C SE 9-27-6w	*	4025
Marion County—		
Cameron Bros. Colbeck 1, SWc 1-22-3e	*	2720
Chase County—		
Watchorn O. & G. Co. White 1, NWc SE 3-18-9e	*	2970

California

Company, Well and Location	Bbls.	Depth
Huntington Beach—		
Geo. F. Getty's No. 5	700	4000
Standard Oil Co.'s Anderson 1	645	4032
Standard Oil Co.'s Huntington 3	840	4068
Superior Oil Co.'s Babbitt 1	400	4002
Long Beach—		
A. J. Delaney's Cerritos 2, wo	15	4848
Featherstone-Preston's Los Cerritos 12	120	4850
Henderson Pet. Corp.'s Los Cerritos 24, wo	154	4799
Hub Oil Co.'s MacMillan Pet. Products 4	110	4812
Geo. W. Johnson's No. 1	90	4822
Marine Oil Corp's Los Cerritos 24	385	5845
Northwest Gasoline Co.s well	50	4420
Jim O'Donnell's No. 36	125	4845
Baldwin Hills-Inglewood—		
Standard Oil Co.'s Cienega 71	100	1965
Torrance-Redondo—		
C. C. M. O. Co.'s Del Amo 60	125	3630
Sunset Area—		
California Pet. Corp.'s No. 7	168	3566
California Pet. Corp.'s No. 4	60	3854
General Pet.'s 248A	20	1155
Poso Creek—		
Big 4 Oil Co.'s McKeon	*	3450
General Pet. Corp.'s Young 1	65	2088
Santa Barbara County—Cat Canyon—		
R. & G. Oil Co.'s No. 9, wo	600	3035

Eastern States

PENNSYLVANIA

Bradford Field—		
South Penn Oil Co. Weston, Jr 96	3	....
Bingham 390, tract 1	2	....
Bingham 398, tract 1	2	....
Bingham 576, tract 114	3	....
Bingham-Satterfield 114	3	....
Bingham 400, tract 72	* 2	....
Bingham 439, tract 97	3	....
Bingham 369, tract 27	2	....
Bingham 150, tract 70	2	....
Hamlin 107	3	....
Rounds 55	3	....
Lawrey & Heston, Lawrey 11	7	....
McCandless & Krampf, Burns 22	3	....
J. W. Kaufman, Rounds 1	7	....
H. P. McKalip, Bingham 1	5	....
Bingham 2	4	....
Wiborg & Co., Meldrum 1	4	....
W. J. Healey, Healey 1	4	....
A. Stover, Stover 1	7	....
F. A. Wile & Co., Franchot 12	4	....
M. C. Roat, Roat 6	3	....
Roat 7	3	....
W. J. Oliver, Franchot 2	4	....
F. D. Gallup & Co., Rew 1	3	....
Rew 2	4	....
A. L. Lilly & Co., Middaugh 1	3	....
Middaugh 2	3	....
N. V. V. Franchot, Rounds 1	7	....
Brink & Lewis, Rew 1	4	....
Barry Bros., Bingham 1	4	....
T. H. Kennedy, Kennedy 1	3	....
C. B. Kervin, Kervin 1	3	....
G. W. Crooks Estate, Crooks 15	3	....
J. V. Golden, Bartell 12	3	....
Devore & Co., Monroe 1	3	....
McDowell & Andrus, Bingham 326, tract 72	3	....
D. W. Daly, Bingham 369, tract 59	3	....
Denwood Oil Co., Garlock 11	3	....
Williams & Schorman, Chambers 1	3	....
Zook & Sloan, Keating 1	3	....
Keating 2	3	....
Thomas & Staley, Duke 1	3	....
Venango County—		
McComb & Moyar, Hood 62	3	....
Hood 88	2	....
Uber, Baird & Co., McKinley 24	2	....
J. P. Mansfield, Baum 9	2	....
Midland Oil Co., McNellie 22	2	....
Reeves & Co., Blair 48	2	....
C. T. McDowell & Co., Miller 5	2	....
J. B. Smitherman, Button 42	2	....
Linwood Oil Co., Jackson 3	2	....
Horne Bros. & Co., Horne 7	2	....
Edward Siederman, Hasson 53	2	....
Butler County—		
Stewart & Co., Stewart 3	4	....
Stewart 4	5	....
Jewell & Co., Hoffman 3	4	....
Hilliard & Co., Glenn 7	3	....
R. Embrie & Co., Osterling 1	*	....
Greene County—		
Natural Gas Co. of W. Va., T. F. Rutan 5	480	....
Philadelphia Oil Co., Mary Jacobs 7	10	....
Greensboro Gas Co., Fay Headley 1	¶½	....
J. J. Mitchell 1	*	....
Carnegie Nat. Gas Co., J. L. Barney 3	¶1½	....
J. H. & Lee McNichols, George Fenner 1	¶2	....
Shough Lease Oil & Gas Co., George W. Shough 1	¶2	....
Charles Garrison & Co., Hannah Shough 2	¶1¾	....
Crawford County—		
H. J. Gilson, Proper 11	12	....
Cozy Oil Co., Small 9	7	....
Kerr & Wilson, O'Dell 2	3	....
Nutting Oil Co., Prather 24	7	....
Clarion County—		
H. E. Rugh, Wentling 4	2	....
A. D. Shorts & Co., Kahle 4	2	....
Galesman & Co., Gabler 1	*	....
H. W. Wilson, Corbett & Co. 2	¶1¼	....

NEW YORK

Allegany County—		
G. W. Hooker & Co., Hooker 1	5	....
C. W. Mead, Mead 1	4	....
Dusenberry & Co., Wheaton 1	3	....
LeSuer & Co., LeSuer 1	3	....
Bartoo & Chiles, Chiles 1	3	....
Bovaird & Miller, Bovaird 1	3	....
Albert Oil Co., Albert 1	3	....

Bury it and forget it,

Reading Pipe Lasts Two to Three Times Longer

THE COSTS of laying a long-distance pipe line are tremendous. Where, then, is the economy in putting down any pipe other than the one that gives the longest service and the least trouble?

The rust-resisting properties of Reading Genuine Wrought Iron Pipe make it the first choice of those operators who demand a pipe line they can lay—and forget. Reading's slightly higher price is forgotten, too, after its many added years of unfailing service—free from leaks and replacements.

Investigate Reading Genuine Wrought Iron Pipe before entrusting your oil to pipe of doubtful qualities.

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World's Largest Makers of Genuine Wrought Iron Pipe
OIL WELL SUPPLY COMPANY, Distributors
Inquire at any of their 100 Branches

READING PIPE
GENUINE WROUGHT IRON

Company, Well and Location	Initial Production Bbls.	Depth
Empire Gas & Fuel Co., Empire 1	3	....
W. T. Lane & Co., Lane 1	3	....
George H. Zink, Zink 1	2	....
WEST VIRGINIA		
Roane County—		
Rock Oil Co., D. H. Borroughs 4	2	....
United Fuel Gas Co., D. C. Taylor Heirs 1	¶2	....
T. G. Jackson 1	¶2	....
P. G. Kelley 1	¶1½	....
Pressly Vinyard 1	¶1½	....
Wetzel County—		
Carnegie Natural Gas Co., Margaret Aberigg 5	3	....
J. H. Furbee Heirs 1	¶2½	....
F. M. Wendell 1	¶2¼	....
Pittsburgh & West Va. Gas Co., O. J. Bartrug 3	¶2½	....
Harrison County—		
Grasselli Chemical Co., H. D. Stewart 1	¶2	....
Hampton Oil Co., J. W. Williams 3	¶2	....
Clarksburg Light & Heat Co., G. & A. Lang 1	*	....
Hoffmier & Deegan, W. A. Rodgers 1	*	....
Ritchie County—		
Hope Natural Gas Co., H. P. Camden 1	*	....
Oakdale Oil & Gas Co., J. F. Lowther 10	*	....
Mellon Bros., Charles Kearns 2	*	....
Maxwell & Co., A. B. White 2	*	....
Clay County—		
South Penn Oil Co., A. B. Hicks 1	5	....
O. D. Stockley 39	30	....
Virginian Gasoline & Oil Co., Lockhart 2	10	....
Wood County—		
Big Sand Oil Co., S. L. Anderson 2	¶¼	....
Forest Cline, J. W. Goodwin 1	10	....
Tyler County—		
Barker & Dowler, M. V. B. George 1	5	....
American Oil Dev. Co., M. Cornell 2	¶3½	....
Kanawha County—		
Tampico Oil & Gas Co., George K. Miles 1	*	....
United Fuel Gas Co., Booker Mullen 1	¶¼	....
Gilmer County—		
Ohio Fuel Oil Co., W. C. Bush, 48 acres 3	10	....
Pleasants County—		
W. H. Winegrove, F. A. Evans 5	1	....
Marion County—		
Owens Bottle Machine Co., Alpha Tennant 1	¶1¾	....
Cabell County—		
J. S. Farr & Co., C. A. Weatherholp 1	¶1½	....
Calhoun County—		
Chemical Oil Co., D. M. Miller 4	¶2¼	....
Braxton County—		
Pittsburgh & W. Va. Gas Co., Harriett Friend 1	¶2	....
Marshall County—		
Doem Dev. Co., Frank Baker 1	*	....
Doddridge County—		
Norbell Oil & Gas Co., M. Underwood 1	*	....
KENTUCKY		
Morgan County—		
D. A. Wishard & Co., John McCarty 1	2	....
George & Touma, L. D. Holbrook 4	2	....
The Willson Oil Co., Lee Owens 40-a	5	....
Estill County—		
Wood Oil Co., Joe Neal 1	5	....
Lee-Owsley Counties—		
Petroleum Exploration Co., Walter T. Coombs 1	¶1	1286
B. Gabbard 1	¶1	968
Wolfe County—		
Petroleum Exploration Co., Spencer Heirs 5	15	....
Christian County—		
Petroleum Exploration, Co., W. E. Denton 1	*	....
Owensboro Field—		
Penn-Indiana Oil Synd., Laura Mercer 9	10	....
Laura Mercer 10	10	....
C. A. Kelly 260 acres 5	7	....
Noble-Bolyard Oil Co., R. A. Owens 1	*	....
Allen County—		
Helka Dev. Co., C. & Effie Sanders 20	1	390
Buchannan & Buchannan, Buchannan 9	*	446
Warren County—		
H. W. Teague, Manning 4	2	1065
Phillips, Stewart & Co., Jeff Coley 1	2	1140
Dr. W. B. Cauble, J. T. Vance 11	5	450
Barren County—		
Star Oil & Gas Co., Richardson 12	12	....
Richardson 13	10	....
A. W. Ziegler Attorney, Darter Bros. 3	20	....
C. D. Boyd 7	*	....
Fred C. Moore, Travis 15	8	....
Toady 1	*	....
Consolidated Gas Co., H. W. Duff 47	20	....
Esslinger Oil Co., C. B. Jones 14	20	....
H. E. Merrifield Trustee, Dean 1	15	....
R. B. Tyler, White 12	10	....
TENNESSEE		
Clay County—		
Dave McGowan, J. W. Pennington 1	250	452
Clark Hill Oil Co., J. M. Gray 2	100	500
K. Thurman 2	50	460
SOUTHEASTERN OHIO		
Washington County—		
Bishop, Hazlette & Co., Martha Guthridge 6	2	....
Henderson Oil Co., George T. Stephen 25	5	....
R. H. Henning & Co., Albert Huntsman 2	10	....
Noble County—		
F. R. Michaels & Co., L. & E. Harper 7	2	425
George E. Jewell & Co., Otis Davis 3	2	....
Morgan County—		
The Pure Oil Co., Gilbert Bush 5	8	....
Monroe County—		
William McCue, C. S. Buchannan 1	2	....
Belmont County—		
Chester L. Wise, C. L. Wise 1	2	....
CENTRAL OHIO		
Licking County—		
Goshen Oil Co., C. E. VanWinkle 3	22	....
Ster C. Brown, H. A. Noland 18	20	....
Leonard Oil & Gas Co., Hoover Bros. 4	12	....
F. M. Rugg & Co., Clint McKinney 11	40	....

When the city of Barnesdall grew into the paved street class, one of its thoroughfares had an oil well, with the shackle rods running down the street. The well owner agreed to abandon it in order to remove the obstruction from the street. Not so with The Great White Father. The powers of the Department of the Interior decreed that the well should remain on duty.

Company, Well and Location	Initial Production Bbls.	Depth
Ohio Fuel Supply Co., Ellen E. Forry 12	25	....
Ellen E. Forry 13	5	....
Medina County—		
E. R. Edson Sons Co., C. G. Packard 26	1	375
Ohio Fuel Supply Co., L. A. Severcool 2	25	360
Logan Gas Co., L. R. Seeley 9	¶¼	....
East Ohio Gas Co., P. Stroskopf 3	¶¾	....
Ohio Fuel Gas Co., H. S. Koppes 1	¶¾	....
George Stroskopf 2	*	....
Hocking County—		
Consolidated Oil & Gas Co., Charles Barlow 1	10	....
Gordon Oil Co., F. S. Chambers 1	40	....
Holmes County—		
Arkansas Fuel Oil Co., William Miller 3	30	....
East Ohio Gas Co., C. F. & V. M. Groffs 1	*	....
Ashland County—		
East Ohio Gas Co., J. H. Miller 2	¶½	....
Ohio Fuel Gas Co., J. H. Bushman 1	*	....
Wayne County—		
Ohio Fuel Gas Co., J. W. Westcott 1	¶1	....
East Ohio Gas Co., J. A. Yocum 5	*	....
Cuyahoga County—		
Wiser Oil Co., M. Souleck 1	¶1½	....
Dempsey Bros., H. F. Eyring 1	*	....
Columbiana County—		
Yaggie Heirs, Yaggie Heirs 1	2	....
Knox County—		
East Ohio Gas Co., Calvin Stout 1	¶¾	....
Cashocton County—		
Casingham & Bell Bros., Cassingham 17	¶¼	....
NORTHWESTERN OHIO		
Hardin County—		
Boston-Southwestern Oil & Gas Co., Ira Schick 2	30	1487
Shelby County—		
Wittmer Property, Trustee, M. & J. Siegel 2	30	1337
Ottawa County—		
The Ohio Oil Co., A. F. Alyn 4	12	1376
Sandusky County—		
Home Banking Co., A. F. Taulker 11	8	1307
Mercer County—		
A. W. Neely & Co., Adam Fecher Heirs 6	8	1192
Allen County—		
Halcyon Oil Co., J. E. Bowsher 1	4	....
Wood County—		
Oko Oil & Gas Co., J. J. Heilman No. 2 tract 1	*	1306
MICHIGAN		
Saginaw County—		
Saginaw Prospecting Co., Waterworks Addition 2	35	1829
Saval Dev. Co., Weiss 1	28	1825
Fordney Pet. Co., James Bisner 1	25	1817
Wells-Schmidt Co., Whittier Mill Lot 1	15	1817
Superior Oil Co., Spatz 2	25	1825
INDIANA		
Daviess County—		
Peek Oil Co., Ragsdale Heirs 2	15	1150
Hart Bros., L. L. Miller 1	*	....
Pike County—		
J. Morrisey & Co., William Miley 1	35	....
Davis, Miller & Wheeler, James Wilson 2	40	....
Knox County—		
Murphy Oil Co., W. E. Harrison 5	5	....
Unknown Parties, George Ryan 1	*	1558
Madison County—		
Pendleton Natural Gas Co., J. Kessling 1	¶1	....
Shelby County—		
Enos Porter, Enos Porter 1	¶½	....
Sullivan County—		
Dome Gas Co., Bledsoe 1	¶1½	....
Wells County—		
Local Co., John Harris 1	*	....
ILLINOIS		
Crawford County—		
Frost Oil Co., A. W. Mann 5	12	972
W. C. Kennedy Co., Asbury Pope 1	3	390
Abbott & Co., L. M. Highsmith 3	2	970
The Ohio Oil Co., J. D. Reaville 12	4	940
Clark County—		
H. C. Ferriman & Co., W. D. Slater 3	35	1601
Lawrence County—		
A. Bruner & Co., W. Denning 11	15	1684

And for Rotary Tongs, Too

The uses for Agathon Alloy Steel in the oil drilling industry are many and varied. Bits of all kinds, jars, joints, underreamers and casing tongs, too, are made of these specially formulated steels that resist wear, shock, stress and strain. The success of these steels in the oil fields has been phenomenal. What part of your product needs a stronger, tougher or greater wear-resisting steel? Tell us about your steel problems. Let our metallurgists help you solve them without charge. Send for a copy of our Agathon Alloy Steel handbook.

We show a Wilson Rotary Tong having jaws and pins made of Agathon Alloy Steel

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Cleveland Detroit Chicago New York Syracuse Philadelphia
Los Angeles, California Tulsa, Oklahoma

AGATHON STEELS

AGATHON ALLOY STEELS

Say you saw it in The OIL WEEKLY

WILDCATS FROM ALL SECTIONS

Northern California Wildcats

COMPLETIONS

Company, Well and Location	Initial Production Bbls.	Depth
Devils Den—		
Devils Den Prod. Co.'s No. 4	125	1228
Sunset—		
Bell-Wrightsman's No. 1	24	5335
Kettleman Hills—		
Bolsa Chica Oil Co.'s No. 1	60	2342

DRILLING REPORT

KERN COUNTY

ANTELOPE PLAINS—W. H. Davis' No. 1, dr 900 ft.

BUTTONWILLOW — Milham Exploration Co.'s No. 1, cement 1028 ft.

COMANCHE POINT—Kern 29 Oil Co.'s No. 1, rigging 1927 ft. Marathon Oil Co.'s No. 1, sd 4390 ft. Luis Lucier's No. 1, preparing to test 1495 ft. Robbins Oil Co.'s No. 1, dr 2065 ft.

FAMOSA—Woodward & Sheedy's No. 1, dr 2617 ft. Union Oil Co.'s Gill 1, rig.

GOULD HILLS — Mendocino-Midway's No. 1, dr 1870 ft. Myrtle F Oil Co.'s No. 1, sd 900 ft. L. E. Westrich's No. 1, dr 460 ft.

SHALE HILLS — Huntington-Hawthorne's No. 1, lcn.

TEMBLOR HILLS—Fortuna Oil Co.'s No. 1, trying to locate water. Painted Hills Oil Co.'s No. 1, sd 500 ft. Hovey Hills Oil Co.'s No. 1, sd 2510 ft.

WASCO—Main Oil Co.'s No. 1, preparing to pull cas 5304 ft.

EASTERN KERN COUNTY—Crusaders Oil Co.'s No. 1, 2262 ft; A1, rigged.

ELK HILLS—Interstate Oil Corp.'s No. 1, sd 5156 ft. Naval Reserve Oil Co.'s No. 1, sd 3676 ft. Fresno-Sunmaid's No. 1, sd 4200 ft. Gore Oil Co.'s No. 1, sd 2100 ft. Shell Co.'s No. 1, fsh 4822 ft.

FRESNO COUNTY

CLOVES—Fresno-Madera Oil Co.'s No. 1, sd 3760 ft. W. W. Taylor's No. 1, dr 1588 ft.

HURON — Associated Oil Co.'s No. 1, dr 1567 ft.

KERMAN — Associated Oil Co.'s No. 2, foundation.

WARTHAM—Bald Mountain Drilling Co.'s No. 1, dr 860 ft. Marland Oil Co.'s Elliott 1, dr 5650 ft. South Coalinga Oil Co.'s No. 1, sd 1390 ft.

VENTURA COUNTY

CAMARILLO—Standard Oil Co.'s Camarillo 1, dr 3290 ft.

CASITAS-OJAI — Miley Exploration Co.'s Casitas 2, fsh 623 ft. Rio Grande Oil Co.'s Canet 9, dr 1867 ft. Star Pet. Co.'s Canet 1, rig.

MOORPARK — Shell Co.'s Berlywood, dr 6590 ft. E. A. Parkford's Simi-Lloyd 1, dr 100 ft.

PIRU CANYON — Henderson Pet. Corp.'s Karr 1, fsh 1162 ft. Bishop-Buckeye's No. 2, rigging rotary. Hopper Canyon Oil Co.'s Rehart 1, dr 5000 ft. Oil Exploration Co.'s Janes 1, dr 100 ft.

SESPE-FILLMORE — Gillette - Howard's Grant-Elkins 1, sd 4160 ft. Sespe Oil Co.'s Smith 2, sd 4003 ft.

VENTURA—Associated Oil Co.'s McGonigle 1, testing 5312 ft. Chanslor-Canfield-Midway Oil Co.'s Hobson 1, fsh 5855 ft. Milham Exploration Co.'s Sexton 1 ,fsh 6219 ft.

SANTA BARBARA COUNTY — Channell Oil & Dev. Co.'s No. 1, sd 4820 ft. Hollywood Oil Corp.'s Sudden 1, dr 870 ft. Miley Exploration Co.'s Goleta 1, dr. Standard Oil Co.'s Palmer Union 1, dr 3355 ft. West Penn Prod. Co.'s Shields 1, fsh 617 ft.

SAN LUIS OBISPO—Arroyo Grande Pet. Co.'s No. 1, fsh 3920 ft. Barneyberg Oil Corp.'s No. 1, cement 4486 ft. Geo. Mapes, Inc.'s No. 1, dr 525 ft. Waklin Pet. Co.'s No. 1, co 2435 ft.

MONTEREY COUNTY — Harriman-Jones Oil Co.'s No. 1, sd 4616 ft. Hennigan-Schwenigan's No. 1, dr 3480 ft. Pan-American Pet. Co.'s No. 1, fsh 2638 ft. Pyramid Oil Producer's No. 1, dr 3109 ft.

TULARE COUNTY — Federal Exploration Co.'s Kinsella 1, dr 3400 ft. Ducor Drilling Co.'s No. 1, re-cement 4162 ft. Martin Pet. Co.'s No. 1, dr 1600 ft. Ozena Oil Co.'s No. 1, dr 350 ft. John Waklin's No. 1, building rig.

YOLO COUNTY—Yolo Oil Co.'s No. 1, rigging up.

SONOMA COUNTY—Shell Co.'s No. 1, dr 2920 ft.

Southern California Wildcats

ALAMITOS HEIGHTS—Pan-American Pet. Co.'s Collins 1, lcn.

ATHENS-WEST—Julian Pet. Corp.'s Mosier 1 dr 2650 ft.

BANDINI—Pan-American Pet. Co.'s De-Baker 1, fsh 1027 ft.

BELLFLOWER—Marine Oil Corp.'s Strong 1, dr 5220 ft.

BURBANK — Jefferies-Overton's Jeffries 2, sd 1300 ft.

BIXBY HILLS—National Securit y Co.'s Orange 1, sd 5151 ft. Orange Co. Pet. Co.'s 1, sd 2820.

CLEARWATER — Featherstone-Preston's Blinn 1, sd 4185 ft.

CLAREMONT—Claremont Oil & Gas Co.'s Hamilton 1, co 1120 ft.

DOMINGUEZ—Dominguez Extension Oil Co.'s No. 1 dr 1280 ft

EAGLE ROCK—Calwin Oil Co.'s Eagle R 1, dr 6070 ft.

EL SEGUNDO—Southern California Drilling Co.'s Matteson 1, dr 250 ft. Union Oil Co.'s Howland 1 fsh 5326 ft.

HAWTHORNE—Winwell Oil Co.'s Dome 1, sd 5586 ft.

IRVINE—Calny Oil Co.'s Irvine 1, sd 4247 ft.

LAWNDALE—Smith Pet. Co.'s Johnson 1, dr 4860 ft.

LANCASTER—Rudd-Asmussen's No. 1, will install rotary 1860 ft.

LONG BEACH-WEST — Miller-Haley's Extension 1, sd cemt 4490 ft.

MANHATTAN—Manhattan-Pacific Oil Co.'s No. 1, sd 4409 ft.

MAYWOOD—Magnolia Pet. Synd.'s No. 1, sd 4452 ft.

NEWHALL-SAUGUS — W. W. Stabler's Castaic 1, dr 2605 ft. George W. John's Wickham 1, bldg rds. Union Oil Co.'s Saugus 1, dr 4369 ft.

PACOIMA—W. O. Brubaker's Fernando 1, stdg 2698 ft.

PLAYA DEL REY—Milham Exploration Co.'s No. 2, fsh 6094 ft.

RESEDA—Petroleum Securities Co.'s Sesnon 1, dr 4320 ft.

SPADRA—Spadra Pet. Co.'s Northey 1, will re-cemt 528 ft.

SAN FERNANDO—Standard Oil Co.'s University 1, dr 4235 ft.

SAN JOSE HILLS—Bardeen Oil Co.'s Didier 3, stdg 1938 ft. D. & B. Oil Co.'s Amar 1, dr 3200 ft.

SAN JUAN CAPISTRANO—A. P. & K. Synd.'s No. 1, sd 2135 ft. California Pet. Developing Co.'s No. 1, dr 2265 ft.

SOQUEL CANYON—E. L. Cragen's M. & S. 1, lcn.

SUNSET BEACH—General Pet. Corp.'s Lomita 1, building roads and grading.

TELGRAPH CANYON—Quadra Pet. Co.'s MJM 1, dr 4015 ft.

TOPANGO CANYON—Standard Oil Co.'s Austin 1, bad casing 1670 ft.

VAN NUYS—Van Nuys Community Oil Co.'s No. 1, dr 3860 ft.

RIVERSIDE COUNTY—Banning Oil Co.'s No. 1, sd 974 ft. Corona Oil & Gas Co.'s No. 1, dr 1300 ft. Spindletop Oil Synd.'s No. 1, co 2590 ft. Trabuco Oil Co.'s No. 1, dr 1700 ft.

SAN BERNADINO CO.—Arrowhead Dev. Co.'s No. 1, dr 1600 ft. Burgess-Goodale's Riggins 1, will plug to test 4110 ft. Como Oil Co.'s Cajon 1, sd 1380 ft. Colton Terrace Oil Co.'s No. 1, dr 1115 ft. Del Rosa Oil Co.'s 1, r 1963 ft. Hesperia Oil & Gas Co.'s 1A, making hole 3360 ft. Mahala Oil & Gas Co.'s 2, making tests of gas capacity 5080 ft. Rimer Oil Co.'s 1, pumping 6 bbls daily. Smith, 1 sd 140 ft. McDermott, sd 549 ft. Victor Valley Landowner's 1, sd 1740 ft. Wade-Bourne-Aldhal's Shoe 1, dr 585 ft. Western Pacific Oil Co.'s 3, dr 1265 ft.

SAN DIEGO COUNTY—Cardiff Oil Corp.'s 1, dr 988 ft. Oceanside Oil Well Co.'s 1, prep to resume dr 3126 ft. Torry Pines Pet. Co.'s 1, lcn.

Kansas Wildcats

BARBER COUNTY—Skelly et al's Richardson 1, SWc 30-30-14, sd 4500 ft. Vickers Pet. Co .et al's Ott 1, SWc 30-32-14, dr 4315 ft. R. B. Brown's Martin 1, NWc 14-34-11, sd 1500 ft. Shaffer O. & G. Co.'s Alexander 1, C SE 13-33-13, dr 3275 ft.

BARTON COUNTY—Huffin et al's Smith 1, NE SE NE 17-19-11, sd 5100 ft.

COWLEY COUNTY—Branson et al's White 1, SEc SW SW 7-30-6, sd 1560 ft.

KINGMAN COUNTY—Harwood & Winter's Lindholm 1, C NE 22-28-5, sd 4026 ft. Crawford and McKenna's Beshere 1, NEc NW 30-28-5, td 4260, showing. Marland Oil Co.'s Padgett 1, NEc SW 11-28-6, dr 3460 ft. Fleeger et al's Greenleaf 1, NEc 13-28-7, ur 3880 ft. Cassody Oil Corp.'s Yeoman 1, C SE 35-28-7, dr 4435 ft. Phillips Pet. Co.'s McKenna 1, C NW 16-28-6, sd 4030 ft. Ozark Drilling Co.'s Richards 1, SEc NE SW 4-30-6, sd 4252 ft. Vickers & Stearns' Keimig 1, C NW 35-30-9, ur 3725 ft. Eben Pyle's Woolsey 1, NE SE 20-27-7, rog.

LYON COUNTY—Culp et al's No. 1, SWc SE 25-19-10, spdg. Gashe & Balliere's Stratton 1, SEc NW 32-20-13, fsh 1800 ft.

RENO COUNTY—Sheldon et al's Manguson 1, SEc NW 10-23-4, set 5-inch 3100 ft. Marland Oil Co.'s O'Neil 1, C SW 7-23-6, cellar. Fleeger et al's Neeley 1, SEc NW 35-23-7, dr 2665 ft. Miss. Valley Oil Co.'s Pexroad 1, SEc NW 25-24-7, sd 3725 ft. Cassody Oil Co.'s High 1, C SE 9-25-7, dr 3885 ft. Frank Hopper's Stevens 1, NWc 7-26-7, sd 4295 ft.

RUSSEL COUNTY—Mid-West's Dortland 1, SE SE NW 5-12-5, sd 3058 ft. Keys Pet. Co.'s Sloan 1, C SE SW E 2-13-15, dr 1630 ft. Wilcox Russell's Wilson 1, E SW 14-12-13, dr 2220 ft.

SUMNER COUNTY—Stalling et al's Rice 1, C NE NE NW 3-32-2, sd 3812 ft.

SEWARD COUNTY—Wilson et al's Son 1, CNE NE NE 14-33-33, lost hole 600 ft.

Oklahoma Wildcats

BECKHAM COUNTY—Magnolia's No. 1, NEc 21-9-23, rig; No. 1, NEc SE NE NW 29-9-23, lcn.

CADDO COUNTY—W. J. Hartley's Calbreath 1, SEc NW SE 28-5-12, dr 3110 ft. Abernathy's No. 1, C NE NW 8-5-11, lcn. Abernathy's No. 1, C SW NW 22-5-11, dr 785 ft.

CANADIAN COUNTY—Hannum, Frank & Slick's Pazoureck 1, SW NE 29-13-5, dr 3815 ft.

CIMMARRON COUNTY — Ramsey Bros.' No. 1, C NW NE 27-5-5, dr 1532 ft. Fenton, Brookine et al's Smaltz 1, SEc NE NE 2-2-0, spd.

GARFIELD COUNTY—Sinclair's Meyers 1, C SE NE 11-24-4, ur 3360 ft. Shaffer & Amerada's Bunker 1, NEc 32-24-4, sd 4551 ft. Haley, Garber & Pulse's Chevekier 1, NWc SW 6-23-4,

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dr 3985 ft. Bu-Vi-Bar's Johnson 1, SWc 31-23-4, sd 4501 ft. Sinclair's Fee 1, SWc SW NE 2-20-5, dr 4419 ft.

GRANT COUNTY—Barzell & Moses' Royce 1, SWc NW 34-26-4, sd 550 ft. Dedman, Flennigan & Hennage's Sherran 1, NEc SW 16-26-3, sd 1910 ft.

HUGHES COUNTY—Sand Pet.'s Harnage 1, C SE SE SE 10-8-9, co 3340 ft. Magnolia Pet. Co.'s Medore 1, NWc SW 28-8-9, dr 3550 ft. Sorry & Swartz's Wallace 1, SEc NW SE 4-8-11, sd 3385 ft. Johnson et al's Bear 1, SWc SE NW 32-8-11, pb 1575 ft.

KIOWA COUNTY—A. C. Varner's Boham 1, SE SW NW NW 5-6-19, sd 1127 ft.

KINGFISHER COUNTY — Marland Oil Co.'s No. 1, SWc NW 12-18-5, sd 4090 ft. Pet. Eng. Core Drilling Co.'s Canfield 1, C NW SE 6-16-7, rig. McKenna & Crawford's Sturgeon 1, NEc SW 27-16-6, dr 1610 ft. Hoffman et al's Otie 1, NWc NE 20-15-8, rig down. Reiter & Foster's Davidson 1, SWc 23-15-5, rig.

KAY COUNTY—Ponco Lee Oil Co.'s McNeal 1, NE 32-26-2, fsh 2360 ft. Tonkawa Dev. Co.'s McDaniels 1, C SE SE SE 15-25-1, fsh 1140 ft. Marland Oil Co.'s School land 1, NEc NW 13-25-2, pulling cas 4046 ft.

LINCOLN COUNTY — Wentz Oil Corp.'s Lukenbeal 1, SWc SE 34-17-2, dr 2950 ft. Olean Pet. Co.'s Morris 1, SEc NW NE 18-16-4, dr 4257 ft. Wilcox O. & G. Co.'s Lillibridge 1, NEc NW 25-15-3, sd 4764 ft.

LOGAN COUNTY—Bryan & Emery's Scott 1, NWc SE 33-19-4, spd. Carter Oil Co.'s Rogers 1, SWc NW 32-19-3, cemt 3847 ft. Franklin Oil Assn.'s Moore 1, SWc SE 28-18-4, co 3945 ft. Santrock Drilling Co.'s Mathews 1, SW SE 11-18-3, rig. Haley & Pioneer's Quair 1, SWc SE 11-18-3, rig burned. Zingery et al's Baker 1, NWc NE NE 5-17-1, stdz. T. B. Slick's Berry 1, SWc SE 28-17-1, cemt 2399 ft. Blackford O. & G. Co.'s Liar 1, C S L N½ SE 28-16-1, sd 1675 ft.

PAYNE COUNTY—Twin State Oil Co.'s Tibler 1, NEc NW NE 23-18-1, dr 1624 ft.

LOVE COUNTY — Shermerhorn-Ardmore's Dillard 1, SEc NE NW 25-6 3, dr 3505 ft.

NOBLE COUNTY—Geo. Miller's 101 Ranch 1, NEc 1-24-1. Independent's Miller 1, SEc NE SE 9-24-1.

OKFUSKEE COUNTY — T. A. Johnson's Leedy 1, NEc SE SE 25-12-9, ur 850 ft. J. M. Kessle's Scott 1, SWc 8-12-11, dr 1500 ft. J. M. McCullough's Carolina 1, NE NW SE 17-10-9, co 3460 ft.

POTTAWATOMIE COUNTY — Shaffer et al's Ives 1, NWc SE SE 12-10-3, sd 2630 ft. McCullough's Madgett 1, NWc 25-10-4, dr 4125 ft. Tidal Osage's Kenyon 1, SWc SE SE 3-8-4, ur 4085 ft. Davis Detrick's McCathy 1, SEc NW 10-6-3, fsh 4500 ft. Croston et al's Hibbard 1, NWc NE SE 20-6-4, sd 3800 ft. Magnolia's Fyke 1, NWc NW 20-7-5, co 3232 ft.

SEMINOLE COUNTY — Carter Oil Co.'s Harjocke 1, NEc N WNW 26-10-6, dr 2350 ft. Superior Oil Co.'s Noble 1, SEc SW SE 10-9-6, dr 2850 ft. Pure Oil Co.'s Josh 1, C E L NW NE 15-9-7, cemt 2952 ft. Magnolia Pet. Strother 1, SEc NW 17-8-6, skidding rig. Empire G. & F. Co.'s Like 1, SWc SW 3-7-6, dr 3665 ft. I. T. I. O. Co.'s Litke 1, C NE NE 9-7-6, sd 2781 ft. Magnolia's Jackson 1, SWc NE 22-7-7, dr 2720 ft.

TILLMAN COUNTY—Ossie Drilling Co.'s Snelling 1, SEc SE SE 13-1-18, sd 1525 ft.

TEXAS COUNTY—Valerius O. & G. Co.'s No. 1, NWc SW 18-3-12, set 8-inch 3050 ft; No. 2, SEc SE 32-5-12, sd 3521 ft. H. F. Wilcox's Zea 1, SWc SE 29-3-12, fsh 3045 ft; Hevery, SEc SE 21-4-14, ur 3710 ft . Foster-Reiter's No. 1, SEc SW 9-3-15, dr 3290 ft. Haley, Garber & Pulse's Ellison 1, NWc SE SE 4-1-12, dr 1830 ft. Reiter-Foster's Kugle 1, C NE 10-2-11, dr 3445 ft. Connell et al's Tanecy 1, SEc NW 5-1-19, spd and sd.

Arkansas Wildcats

COMPLETIONS

Company, Well and Location	Initial Production Bbls.	Depth
Bradley County—		
Wingfield et al's Southern Lumber Co. 2, 2-16-12	*	3007
Ouachita County—		
J. D. Reynolds' Cortier 1, 2-14-18 ..	*	1897

DRILLING REPORT

BRADLEY COUNTY — Arkansas Fuel Oil Co.'s Arkansas Lbr. Co. 1, 25-16-12, rig. Magnolia Pet. Co.'s Arkansas Timber Co. 1, 35-15-11, dr 3100 ft. McMurray et al's Southern 1, 7-15-11, dr 3255 ft. Phillips Pet. Co.'s Southern 1, 36-11-16, dr 1835 ft.

COLUMBIA COUNTY — Gulf Ref. Co.'s Huggins 1, 31-17-22, set 10-inch 276 ft. Haynes et al's Runyon 1, 3-16-21, rig. Ky-Ark Pet. Co.'s Doss 1, 29-19-20, sd 2570 ft. Magnolia Pet. Co.'s Sawyer 1, 1-16-20, dk. Scott Phillips' Davis 1, 6-18-20, sd 2000 ft.

DREW COUNTY—McClintock et al's Ogle 1, 35-13-5, fsh 2530 ft.

GRANT COUNTY—Jones & Watkins' Meek 1, 5-4-11, dk pat.

HEMPSTEAD COUNTY — Burton et al's Garland 1, 23-10-25, fsh 2210 ft. Myers et al's Nicholls 1, 17-11-25, sdtr 2260 ft.

JEFFERSON COUNTY—Decem Oil Co.'s Hensley 1, 7-3-10, dr 2550 ft.

LA FAYETTE COUNTY — Arkansas Fuel Oil Co.'s Allen 5, 18-19-24, wosr 2788 ft. Ken-Saw Pet. Co.'s Red River 2, 3-20-24, sw 2840 ft.

LITTLE RIVER COUNTY—Greeson et al's Waldrip 1, 4-13-21, sd 1740 ft. Grote et al's Allen 1, 2-13-29, sw 2941 ft. Johnson et al's Hawkins 1, 10-11-31, dr 1925 ft.

MILLER COUNTY—Lenze et al's Dale 2, 28--5126, set 10-inch 100 ft.

NEVADA COUNTY—Furen et al's Fuller 1, 6-13-21, dr 800 ft. Humble O. & R. Co.'s Bodcau 4, 9-15-22, dr 3040 ft.

OUACHITA COUNTY — Grayson et al's Reynolds 1, 21-14-17, dk. Van Diver et al's Yarbrough 1, 22-14-17, sd 1733 ft.

UNION COUNTY—Allison et al's Howard 1, 8-19-13, dk pat. Belmont et al's Hollis 1, 15-18-15, dr 2025 ft. Calgo Oil Co.'s Primm 1, 9-1-8-17, dr 2120 ft. Grimes & Jones' Van Hook 1, 8-18-14, set 5 3/16-inch 2215 ft. H. L. Hunt's Dykes 1, 21-18-12, dk pat. Mathews et al's Lewis 1, 14-19-12, set 6⅝-inch 2650 ft. Marine Oil Co.'s Thompson 1, 10-18-13, to test 2530 ft. H. O. Mullen Trust's Hill 1, 10-18-16, dr 1450 ft. Natural G. & F. Corp.'s Cordell 1, 9-18-13, coring 2985 ft. Simms Oil Co.'s Simmons 1, 9-18-13, coring 3020 ft. Southern C. O. P. Co.'s Hill 1, 5-18-13, set 12½-inch 244 ft. Superior Oil Co.'s Cordell 1, 5-18-13, lcn. Thorpe et al's Peck 1, 22-18-13, sd 2090 ft. Walber et al's Cordell 1, 6-18-13, wosr 2984 ft. Wingfield et al's Morrison 1, 5-19-13, rig.

Louisiana Wildcats

COMPLETIONS

Company, Well and Location	Initial Production Bbls.	Depth
Caldwell Parish—		
Roxana Pet. Corp.'s La. Central Lbr. Co. 1, 22-12-3w	*	1550
La Salle Parish—		
Tunica Pet. Co.'s L. & A. Oil Co. 12, 17-7-3e	*	2617
Natchitoches Parish—		
Davidson et al's Louisiana Long Leaf Lbr. Co. 1, 21-7-9	*	2031
Keator et al's Prudhomme 1, 96-8-6	*	1383
Webster Parish—		
McDowell et al's Hortman 1, 15-20-10	*	2505
Winn Parish—		
Humble O. & R. Co.'s Grant Lbr. Co. 1, 28-9-3w	*	2585

DRILLING REPORT

BIENVILLE PARISH—Collins & Woodley's Thomas 1, 23-16-10, set 6-inch 2548 ft. Kimbrough et al's Cargyle 1, 27-15-8, dk.

BOSSIER PARISH—Collins & Woodley's Roberson 1, 22-23-12, dr 315 ft. Doern et al's Bolinger 1, 9-22-11, plugged back to 2673 ft. Tubbs et al's Jacobs 1, 26-20-13, dk.

CADDO PARISH—Dixie Oil Co.'s Jolley 1, 27-22-15, fsh 4413 ft; Slattery 10, 27-21-15, dr 3060 ft. Magnolia Pet. Co.'s Bradford 1, 24-21-15, dr 3990 ft; Dillion 16, 24-21-15, dr 3670 ft; Dillion 17, 24-21-15, dr 3645 ft. Ohio Oil Co.'s Caddo Levee Board 1, 28-23-16, rig. The Texas Co.'s Caddo Mineral Lands 42, 23-21-15, to reset 4¾-inch 3825 ft.

CATAHOULA PARISH—S. D. Hunter's Tensas Delta 1, 36-10-7e, dr 175 ft.

CALDWELL PARISH — Robbins et al's Beazley 1, 10-11-4e, sd 1020 ft. Southern Crude Oil Purch. Co.'s Caldwell A-5, 23-13-5e, dr 50 ft. Victor Wenzel's Caldwell 1, 22-14-4e, rig. Wright et al's Love 1, 16-11-2e, sd 1625 ft.

CLAIBORNE PARISH—Gilliland Oil Co.'s (Ramsey) Taylor B-10, 14-23-8, sd 4807 ft. Triangle Drilling Co.'s Keen 1, 7-19-5, dr 4605 ft. Underwood et al's Bullock 1, 2-20-7, rig.

DE SOTO PARISH—Alden Oil Co.'s Powell 1, 13-11-10, sd 1607 ft. Craige & Montze's Riggs 1, 28-15-13, sd 1380 ft. Dixie Oil Co.'s Jenkins 1, 9-12-11, sd 4683 ft. Helm et al's Joyner 1, 28-11-12, sd 250 ft. Snapp et al's Flores 1, 27-11-11, dr 2860 ft.

EAST CARROLL PARISH—T. A. Snell's Gordon 1, 34-20-12e, dr 900 ft.

FRANKLIN PARISH—Arkansas Fuel Oil Co.'s Blue 1, 9-12-6e, dk. R. W. Williams' Elkhart-Lemon 1, 17-14-8e, set 10-inch 68 ft.

GRANT PARISH—Billeau et al's Ball 1, 19-7-1e, sd 150 ft. Gulf Ref. Co.'s Swope 2, 17-9n-1e, sw 1610 ft. Holmes et al's Holmes 1, 17-9n-1e, dk; Holmes A-1, 17-9n-1e, dk pat. J. L. Holmes' Fee 2, 17-9n-1e, dk. Humble O. & R. Co.'s L. & A. Oil Co. 11, 29-9n-2w, lcn. Keen & Woolf's Rider 1, 16-9n-1e, dr 1705 ft. J. J. Long's Calhoun 1, 4-7-4w, sd 1285 ft. Tunica Pet. Co.'s L. & A. Oil Co. 8, 11-8n-2w, sd 250 ft; L. & A. Oil Co. 9, 3-8-2w, dk; L. & A. Oil Co. 10, 8-8-1w, dk.

JACKSON PARISH—El Dorado Chief Oil Co.'s Jones 1, 3-14-4w, sd 2610 ft. Ferguson Trust's Martin 1, 3-15-1e, dr 2925 ft. Grigsby & Co.'s Adams 1, 22-17-4w, sd 2400 ft. Houseman et al's Norton 1, 34-15-3w, sd 400 ft. Louisiana Pet. Co.'s Theus 2, 12-16-3w, dr 625 ft. Raymond et al's Davis 1, 13-16-2e, rig.

LA SALLE PARISH—Tunica Pet. Co.'s L. & A. Oil Co. 13, 25-8-1e, dr 1715 ft; L. & A. Oil Co. 14, 29-7-4e, rig.

LINCOLN PARISH — Arkansas Fuel Oil Co.'s Nobles 1, 18-19-3w, dk. Buckley & Palmer's Davis 1, 12-20-3w, dr 2555 ft.

NATCHITOCHES PARISH — Brothers et al's Cockfield 1, 7817-5w, r 1866 ft. Forrest Trust's Ayers 2, 3-13-7, sd 1900 ft. Gulf Ref. Co.'s Louisiana Long Leaf A-1, 39-7-7, dr 1490 ft. McCormick et al's Russell 1, 41-10-7, sd 1700 ft. Ohio Oil Co.'s Louisiana Long Leaf 2, 20-8-8w, dr 125 ft. J. F. Palmer's Edenborne 1, 4-11-6, sd 2015 ft. E. Self's Fisher 1, 18-8-9w, dr 2100 ft. The Texas Co.'s Moss 1, 31-7-8w, rig.

OUACHITA PARISH — Ouachita Natural Gas & Oil Co.'s D'Arbonne 2, 25-19-2e, coring 2360 ft.

RAPIDES PARISH—Hincy & Mack's Barrow 1, 29-5-2e, dr 2750 ft. Minnesota Oil Co.'s Wattermark 1, 7-5-3wfi sd 600 ft. Libuse Oil & Gas Co.'s Voda 1, 12-4-1e, dr 1700 ft. Seip et al's Ball 1, 41-4-2w, sd 2050 ft.

RICHLAND PARISH—Gulf Ref. Co.'s England 1, 32-17-6e, dr 1470 ft; Weyman 1, 23-18-8e, dr 2720 ft. Oliver et al's Hatch 1, 2-15-5e, dk pat. Roxana Pet. Co.'s Humble 1, 10-14-6e, rig.

SABINE PARISH—Emlet et al's Bowman-Hicks 5, 8-7-12, sd 4070 ft; Bowman-Hicks 7, 11-7-14, sd 2120 ft; Sabine Lbr. Co. 1, 8-7-1e, dk. Godchaux et al's Mills 1, 12-4-13, set 10-inch 85 ft. Magnolia Pet. Co.'s Louisiana Long Leaf 1, 16-6-11, dr 1750 ft. Reliance Co.'s Wyatt 1, 23-5-12, set 10-inch 169 ft.

UNION PARISH—Camette et al's Tugwell 1, 21-22-1e, dk. Gulf Ref. Co.'s Nelson 1, 5-19-1e, dr 2770 ft.

WEBSTER PARISH—Labore et al's Bruner 1, 30-19-10, sd 278 ft. Ohio Oil Co.'s Bank of Cotton Valley 4, 22-21-10, dr 3170 ft. Smitherman & McDonald's Oakley 1, 29-23-11, dr 4905 ft. Southern Crude Oil Purch. Co.'s Munn-Wadley 1, 1-22-10, fsh 4620 ft.

WINN PARISH—Allen Drilling Co.'s Sanders 1, 21-13-2w, dr 1770 ft. Dodge et al's Tremont 1, 35-13-3w, rig. Humble O. & R. Co.'s L. & A. Oil Co. A-15, 26-10-2w, rig. Hyde & Nelson's Louisiana Central Lumber Co. 1, 16-13-1w, rig. J. C. Long's Milam 1, 28-13-3w, to set 8-inch 704 ft. Ohio Oil Co.'s Edenborne 1, 4-12-1w, r 2568 ft.

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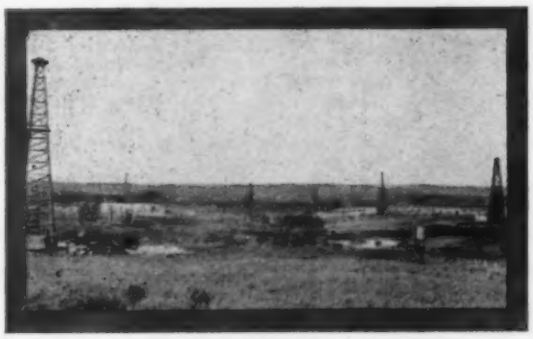

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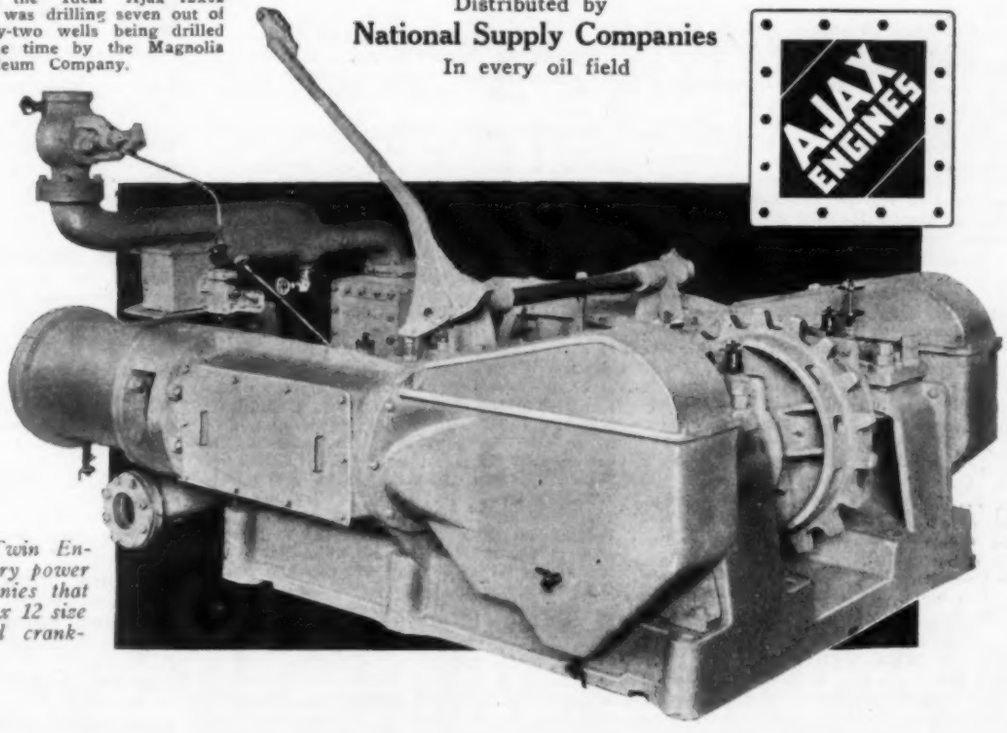
AJAX Snap Shots

Three Out of Four Ajax Drilled

Ajax snapshots of the Wewoka Oil Field. Seventy-five per cent, at least, of the wells in the picture were drilled by Ajax single and Ideal-Ajax twin engines. One model engine alone, the Ideal Ajax 12x12 Twin was drilling seven out of twenty-two wells being drilled at one time by the Magnolia Petroleum Company.



The Ideal-Ajax Twin Engine is standard rotary power equipment for companies that watch costs. The 12 x 12 size has the new enclosed crankcase.

IDEAL-AJAX

Rocky Mountain Wildcats

COMPLETIONS
NEW MEXICO

Company, Well and Location	Intial Production Bbls.	Depth
Lea County—		
Prairie Oil & Gas Co.'s No. 1	*	....
Chaves County—		
Marland Oil Co.'s No. 1	*	1770
Gibson Oil Co.'s No. 1	*	688
Colfax County—		
Union Oil Co. of California's No. 2	*	3280

DRILLING REPORT
WYOMING

Texas Production Co.'s No. 1, Quealy dome, 13-17-77, dr 2930 ft. Criterion Oil Co.'s No. 1, Douglas, 5-31-70, dr 3015 ft. Carter Oil Co.'s No. 2, Billy Creek, 17-48-82, dr 4041 ft; No. 1, Horse Creek, 35-17-70, dr 2690 ft! No. 1, Nowood, 5-48-90, dr 755 ft. Texas Production Co.'s No. 5, Lost Soldier, 3-27-90, dr 1523 ft; No. 5, Maverick Springs, 26-6-101, dr 1100 ft; No. 1, Big Sand Draw, 15-32-95, dr fsh 3075 ft. Prairie Oil & Gas Co.'s No. 2, Buffalo Basin, 17-27-95, dr fsh 3075 ft. Prairie Oil & Gas Co.'s No. 2, Buffalo Basin, 17-27-95, dr 2550 ft; No. 1, Gooseberry, 33-47-1000, fsh 3648 ft; No. 7, Lost Soldier, 11-26-90, fsh 1410 ft. Midwest Refining Co.'s No. 2, Notches, 3-37-35, Tensleep sand, td 2767 ft; No. 1, Dutton Creek, 1-18-78, oil sand, td 4900 ft; No. 1, La Barge, 21-27-113, dr 410 ft. Union Oil Co. of California's No. 1A, Black Mountain, 34-43-91, dr 1783 ft; No. 1AB, Black Mountain, 28-43-91, dr 2240 ft; No. 14, Maverick Springs, 15-6-2, dr 360 ft; No. 1C, Fremont County, 15-5-1, dr 1920 ft; No. 1SC, Fremont County, 10-28-92, dr 3910 ft; No. 1G, Freemont County, 27-1-1, dr 335 ft. Utah Oil Refining Co.'s No. 1FC, Black Mountain, 26-43-91, dr 2442 ft; No. 1A, Black Mountain, 5-42-90, dr 855 ft; No. 2S, Black Mountain, 36-43-91, dr 532 ft; No. 2W, Black Mountain, 35-43-90, dr 1150 ft. Producers & Refiners Corp.'s No. 1, St. Mary's 14-21-84, sd 600 ft; No. 2, Clay Basin, 22-3-24, dr 5400 ft; No. 1, Murphy dome, 8-43-91, dr 2448 ft; No. 5, Wertz, 7-26-89, changing to rotary rig; No. 19F, Ferris, 25-26-87, dr 100 ft; No. 9, Eight Mile Lake, 35-20-88, dr 3850 ft; No. 1P, Parco, 21-21-86, lcn; No. 9, Ferris, 11-26-90, dr 380 ft; No. 2, Garland, 24-56-98, dr 2510 ft; No. 5, Sand Draw, 10-32-95, fsh 3310 ft.

COLORADO

Great Dome Oil & Gas Co.'s No. 1, Las Animas County, 9-34-62, spd. Marland Oil Co.'s No. 1, Moffat County, 16-3-91, dr 1935 ft; No. 1, Moffat County, 34-4-92, dr 1375 ft. Gypsy Oil Co.'s No. 1, Garfield County, 5-8-102, dr 3551 ft. Repollo Oil Co.'s No. 1, Boulder County, 33-1-70, ur 4720 ft. Poudre River Oil Co.'s No. 1, Larimer County, 33-8-69, dr 2165 ft. West Side Development Co.'s No. 1, Larimer County, 5-8-69, dr 711 ft. Moffat Petroleum Co.'s No. 1, Moffat County, 13-4-92, dr 650 ft Texas Production Co.'s No. 1, Tow Creek, 5-6-86, sd 1210 ft; No. 2, Rio Blanco County, 31-2-102, fsh 2315 ft; No. 1, Moffat County, 27-3-94, dr 535 ft. Midwest Refining Co.'s No. 2, Rio Blanco County, 30-2-102, fsh 2700 ft.

NEW MEXICO

Capital Oil Co.'s No. 1, Roosevelt County, 4-1-30, dr 3512 ft. Congress Oil Co.'s No. 1, San Juan County, 34-29-11, sd 1675 ft. Prairie Oil & Gas Co.'s No. 1, Lea County, 34-18-32, abn. Marland Oil Co.'s No. 1, Chaves County, 4-15-6, abn, td 1770 ft. Gibson Oil Co.'s No. 1, Chaves County, 8-11-23, abn, td 688 ft. Union Oil Co. of California's No. 2, Colfax County, 25-31-18, abn, td 3280 ft. Hub Oil Co.'s No. 1, Valencia County, 13-6-2, dr 3142 ft. W. P. Cooper Interests' No. 1, Lea County, 27-19-38, dr 350 ft. Portage Oil & Gas Syndicate's No. 1, San Juan County, 24-31-11, sd 1200 ft. Twenty-Six Oil Co.'s No. 1, San Juan County, 21-29-11, dr 100 ft. Union Oil & Mining Co.'s No. 2, San Juan County, 8-29-9, fsh 2995 ft. Etz-D'Vito Oil Interests' No. 1, Chaves County, 24-11-15, dr 800 ft.

UTAH

Western States Development Co.'s No. 2, Gibson, 12-30-20, dr 450 ft. Utah Oil Development Co.'s No. 1, Moab, 8-26-22, dr 1050 ft. Utah Petroleum Co.'s No. 1, Hulkito, 36-41-17, dr 428 ft. Empire Oil & Gas Co.'s No. 1, 6-30-21, dr 175 ft.

Texas Panhandle District

COMPLETIONS

Company, Well and Location	Initial Production Bbls.	Depth
Potter County—		
Amarillo Oil Co.'s Lee Bivins 5-A..	¶16	2650
Swisher County—		
Overson & Keagans' L .H. Woodward 1	*	840

West Texas Wildcats

COMPLETIONS

Company, Well and Location	Initial Production Bbls.	Depth
Crane County—		
The Texas Co.'s H. M. King 6....	120	2352
Ector County—		
Llano Oil Co.'s Cowden 1.....	*	3508
Garza County—		
Emerald Oil Co.'s J. M. Boren 1..	7	2600
Howard County—		
Magnolia Pet. Co.'s Otis Chalk 3-A	80	1599
Winkler County—		
Brandon-McCamey et al's TP Fee 1,	*	3502
Taliaferro & Sid Richardson's Sealy 1	*	3537

DRILLING REPORT

ANDREWS COUNTY—Amon G. Carter et al's Cowden 1, rig. Maer-Staniforth et al's W. S. Taylor 1, lcn. Henry Zweifel et al's Means 1, lcn.

BREWSTER COUNTY— Green Valley Oil Corp.'s J. P. Wilson 3-A, spd. John Roseborough et al's Skinner 1, ur cas 1290 ft.

COKE COUNTY—Lipan Oil Co.'s C. E. Rawlings 1, sd 2700 ft.

CONCHO COUNTY—Culbertson Bros. & Co.'s W. G. See 1, dr 1515 ft. Eugene Mays et al's Wilson-Hartgrove 1, sd 965 ft. The Exploration Co.'s Hartgrove 1, dr 1110 ft. Kenneth Kimberlin et al's Schultz 1, sd 1570 ft.

CRANE COUNTY — Duffey Bros. et al's Cowden 1, elevation 2461 ft, top salt 752 ft, dr 1915 ft; Griffith 1, lcn. Bill Dunning's Crier-McElroy 1, elevation 2582 ft, top salt 958 ft, dr 272 0ft. Gulf Prod. Co.'s University-Lassiter 1, top salt 1163 ft, fsh 1475 ft; J. T. McElroy 2-A, dr 500 ft; Crier-McElroy 1, elevation 2597 ft, top salt 990 ft, top lime 2658 ft, flowing 500 barrels 2673-2720 ft; Crier-McElroy 2, top salt 956 ft, top lime 2660 ft, flowing 400 barrels 2688-2811 ft; Crier-McElroy 3, elevation 2601 ft, top salt 965 ft, top lime 2668 ft, dr 2735 ft. Independent O. & G. Co.'s Hughes 1, dr with 1500 ft oih at 2408 ft. Magnolia Pet. Co.'s University-Hardwick 1, dr 655 ft; University-O'Keefe 2, top salt 1180 ft, dr 1615 ft; University-Lassiter 1, rig. Magnolia Pet. Co. et al's University-Church 3, lcn. Marland Oil Co.'s Cowden 1-A, top salt 660 ft, dr 720 ft; Dawson 1, top salt 670 ft, set 8¼ cas 2260 ft; Durham 2, dr 920 ft; Durham 3, dr 160 ft; Hughes 2-C, swabbed 55 barrels after shot 2287-2323 ft; Hughes 3-C, sd for shot with 1000 ft oih 2294-2320 ft; Hughes 4-C, rig; Hughes 2-R, rig; Hughes-Gibbs 2, dr 350 ft; Gibbs 1, plugging back from water 2333 ft. Prairie O. & G. Co.'s University 1, sd 800 ft; University 2, dr 715 ft; University-Collett 1, lcn. Ben D. Simon et al's Brookfield 1, dr 310 ft. Simms Oil Co. and Atlantic's University 1, spd. The Texas Co.'s H. M. King 7, sd to pump after shot 2304-30 ft; King 10, dr 460 ft; King 11 and 12 ,rigs. Tidal Oil Co. et al's University 2, dr 150 ft; University 3, rig. Henry Zweifel et al's Cowden 1, rig.

CROCKETT COUNTY—Cranfill Bros. Oil Co.'s Harris 1, dr 365 ft. Cumberland O. & G.s Co. et al's Couch 1, dr 2020 ft. Gulf Prod. Co.'s Powell 1-D, set 8¼ cas 2340 ft. J. K. Hughes Dev. Co.'s Powell 2-A, elevation 2795 ft, top salt 1150 ft, dr 2115 ft; Powell 3-A, dr 2335 ft; Powell 2-B, sd 2420 ft. Humble & Marland's Powell 1-B, dr 1115 ft. Magnolia Pet. Co.'s Shannon 2 ,rig. Republic Prod. Co.'s Powell 1, dr 2585 ft. Wm. Schaffer et al's University 1, swabbed 5 barrels oil, td 2191 ft, sd for fuel. Ben Simon & Cromwell's Shannon 1, dr 2815 ft. Young & Cromwell's Shannon 1, fsh 500 ft. Wilcox O. & G. Co.'s University 1, sd prob abn 4750 ft.

CULBERSON COUNTY — Big Lake and Plymouth Oil Co.'s C. L. Cass 1, sd 350 ft. James H. Gardner et al's Radford-State 1, rig. Pure Oil Co.'s TP Fee 1, dr 215 ft.

JEFF DAVIS COUNTY—Herbert Oil Co.'s T. M. Wingo 1, sd 3012 ft. Humble O. & R. Co.'s W. W. McCutcheon 1, co 3120 ft. J. K. Hughes Dev. Co.'s J. Z. Means 1, dr 605 ft; Means 2, lcn.

ECTOR COUNTY—J. S. Cosden et al's Connell 1-A, elevation 2847 ft, top salt 875 ft, top lime 3170 or 3235 ft, swabbed 70 barrels oil 3465-3500 ft; Connell 1-B, elevation 2827 ft, top salt 1000 ft, top lime 3290 ft, co 3770 ft. The Exploration Co.'s TP Fee 1, top salt 1528 ft, fsh bailer 3875 ft; J. D. Slator 1, rig. Llano Oil Co.'s Cowden 1, plugged contract depth 3508 ft. Taliaferro & Sid Richardson's Henderson 1, elevation 2974 ft, top salt 1135 or 1165 ft, dr 3195 ft.

FISHER COUNTY—Ideal Oil Co.'s W. F. Martin 1, dr in water sand 3428 ft. R. W. Rainey et al's Marberry 1, sd contract depth 1502 ft. Clark-Baldridge & Dillard's Wheeler 1, lcn.

GARZA COUNTY—Emerald Oil Co.'s J. M. Boren 1, (worked over after shot) flowing 7 barrels oil through 2-inch tubing 2600 ft.

GLASSCOCK COUNTY—Marland Oil Co. et al's Calder 1, dr 2180 ft. Plateau Oil Co.'s L. S. Bell 1, dr 1110 ft. Texon & Marland Oil Co.'s Settles 1, lcn.

TOM GREEN COUNTY—M. D. Bryant et al's Llano County Fee 1, sd 2980 ft. Texon & Marland Oil Co.'s Sorrell 1, hfw at 1080 ft, dr

HOWARD COUNTY—Humble O. & R. Co.'s Douthitt 1, dr 715 ft. Lockhart & Co. & Carey's Roberts 1, ur cas 710 ft; Chalk 1-A, dr 1340 ft; W. T. Scott 1, dr 2005 ft. Magnolia Pet. Co.'s Mary Chalk 1, sr 1270 ft; Chalk 2, lcn; Otis Chalk 3, dr 1380 ft; Chalk 4, lcn; Chalk 3-A, swabbing 80 barrels oil 1586-99 ft; Chalk 4-A, dr rotary 1140 ft. Marland Oil Co.'s Otis Chalk 3, show oil 1604-23 ft, sd for shot; Chalk 4, sd 1122 ft. Reeves-Apperman et al's Clay 1, sd 930 ft.

JONES COUNTY—Atlantic Oil Prod. Co.'s Howe 1, rig. Bateman-Campbell et al's Southard 1, lcn. Cole-Hart et al's Cranston 1, lcn. Hucony Gas Co.'s Wright 1, dr 1065 ft; Sears 1, dr 880 ft. Gillette & Hickey's S. W. King 1, ur 8¼ cas 1586 ft; Young 1, sd 360 ft. Marland Oil Co.'s S. R. Cox 1, dr 2300 ft; Mason-Harris 1, fsh cas 825 ft. Mid-West Exploration Co.'s Thornton 1, fsh 1060 ft. Muse-Robertson's Manley 1, machine. Vic H. Martin et al's Culbertson 1, rig. Phillips Pet. Co.'s Walling 1, dr 995 ft. Taliaferro & Wentz Oil Corp.'s King 1, show oil 1623-25 ft, ur 1945 ft. World Oil Co.'s Boney & Stanford 1, lcn, Zweigler et al's Reeves 1, rig.

KENT COUNTY—The Texas Co.'s Barron 1, sd 4362 ft.

KIMBLE COUNTY—Dixie Oil Co.'s Harrison 1, dr 1305 ft.

LOVING COUNTY—Duffey Bros. & Arnold's W. D. Johnson 1, lcn. Lockhart & Co.'s R. L. Allen 1, dr 3600 ft.

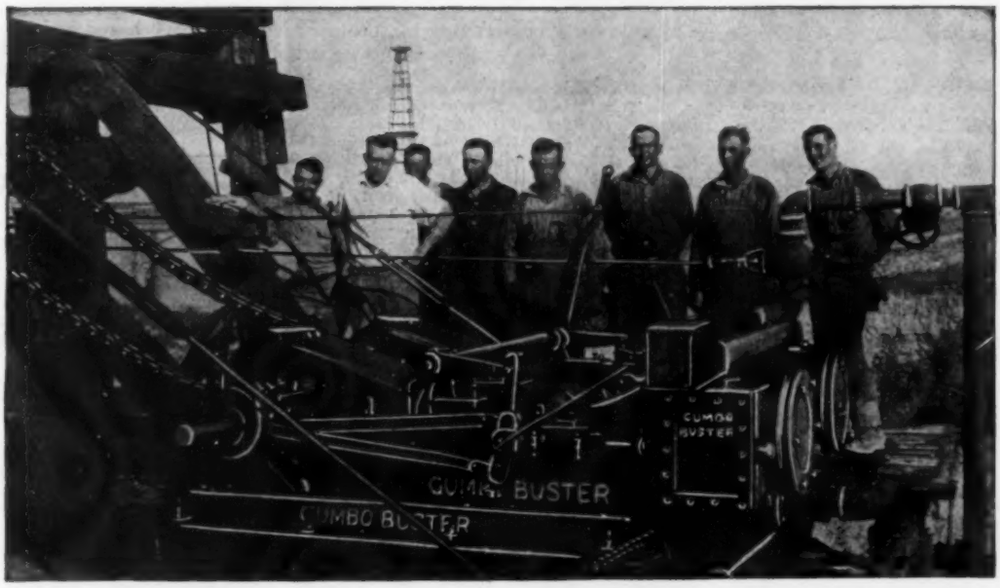
LYNN COUNTY—Hart Oil Corp.'s Edwards 1, sd 1390 ft.

MENARD COUNTY—J. R. Lewis et al's White 1, sd 180 ft. Clark et al's Kothman 1, dr 245 ft. Robinson-Dyer & Cobb's Wilhelm 1, lcn.

MITCHELL COUNTY—Magnolia Pet. Co.'s Foster 2, fsh 1510 ft. Mid-Kansas O. & G. Co.'s Ellwood 2, dr 2060 ft. Morrison-Thompson's Griffith 1, lcn. Owen-Sloan Oil Co.'s C. P. Conway 1-A, dr 3145 ft. Teas-Stivers et al's Hardee 1, fsh 475 ft. F. P. Zoch et al's J. J. Ford 1, dr 2580 ft.

NOLAN COUNTY—Hucony Gas Co.'s Arthur Sears 1, elevation 1950 ft, dr 2715 ft.

Gumbo Buster Machinery + Good Men = Contractors Profits



The crew in the above picture are (reading from left to right): M. L. Middleton, fieldman, Republic Supply Co., Pampa; N. (Red) Ammons, superintendent rotary tools, Cady & Conner; L. W. Butler, fireman; A. L. Rogers, driller; O. A. (Curley) McGuahy, driller; R. P. Perry, derrickman; R. B. Dillon, fireman; Jack Harrington, floorman.

Cady & Conner, rotary and cable tool contractors, made unusually fast time on Phoebe Worley No. 3 for the McMan Oil & Gas Co., Gray County, Texas.

The rig is a complete "Gumbo Buster" outfit, with Twin Cylinder Engine, Type F Pumps, Standard Seamless drill pipe, B & S boilers, and Yellow Strand wire lines, making a complete REPUBLIC "job."

Old Rep says:

Fer plenty of excitement I recommend evangelism or being an injun guide. Them boys sure did skip through the dew on that Phoebe job.

A complete line of drilling supplies always on hand at

Republic Supply Company

OIL AND GAS WELL SUPPLIES
ROTARY AND CABLE TOOLS

OKLAHOMA TEXAS ARKANSAS LOUISIANA

Henry Zweifel & Hofmeier's Longbotham 1, spd.

PECOS COUNTY—Benedum-Trees' J. S. Trees 1, sd 530 ft. Cromwell & Kimberlin's Scharff-Blackman 1, spd and sd. J. G. Buell-Hagan et al's So. Life Inc. Fee 1, fsh 575 ft. Dixie Oil Co.'s Hersheusen 1, elevation 3282 ft, sd in sand 5346 ft. Mid-Kansas O. & G. Co.'s I. G. Yates 1, dr 215 ft. Transcontinental Oil Co.'s Perry 1, crooked hole 3535 ft. Quinby Oil Co.'s Bennett 2, dr 240 ft; Townsite 1, sd 3280 ft.

PRESIDIO COUNTY — Hadlock-Miller et al's Tootle 1, sd 2255 ft.

REAGAN COUNTY—H. D. Camp et al's University 1, sd 2786 ft. Cope-Hagan et al's L. H. White 1, lcn. The California Co.'s University 3, rig. Hiawatha Oil Co.'s University 1, materials. Moody Oil Corp.'s Sawyer 1, dr 1020 ft. Roxana Pet. Corp.'s Boyd 1, elevation 2650 ft, top salt 1155 ft, dr 2625 ft. Texon Oil & Land Co.'s University 5, Group 2, top salt 1370 ft, dr 2360 ft; University 6, rig. Texon & Marland Oil Co.'s Sawyer 1, dr 2480 ft.

REEVES COUNTY—Carl Cromwell et al's TP Fee 1, dr hfw 3315 ft. Deep Rock Oil Co.'s Caldwell 1, lcn. Grisham-Hunter Corp.'s State Fee 1, dr 1610 ft. World Oil Co.'s B. T. Biggs-Holder 1, dr 195 ft.

RUNNELS COUNTY—Red Bank Oil Co.'s Fowler 1, dr 1545 ft. F. P. Zoch et al's Bruce 1, dr 1510 ft. Frank Yates et al's McMillen 1, materials.

SCHLEICHER COUNTY—Beavers-Leath et al's Whitten 1, spd and sd. Cope-Dalton et al's Sol Meyer 1, dr 2020 ft. S. C. Magee et al's Robinson 1, materials.

SCURRY COUNTY—Northwest Co.'s T. C. Stinson 1, cem cas 610 ft; Welborn 1-A, sd 3435 ft.

STERLING COUNTY—The California Co.'s J. T. Davis 2, dr 410 ft. Co-Operative Dev. Co.'s Douthitt 1-A, sd 3230 ft. The Exploration Co.'s C. A. Broome 1, sd hfw 3011 ft.

TAYLOR COUNTY—City of Abilene's Fee 1, dr 1405 ft. Sanger O. & R. Co.'s R. H. Anderson 2, show oil and gas 1884 ft, dr 1965 ft; Cox 1, dr 1415 ft.

TERRELL COUNTY—Sun Oil Co.'s N. M. Scott 1, dr 1600 ft. E. T. Williams et al's Cowden 1, ur with hfw 2800 ft.

TERRY COUNTY—Kingsland Oil & Potash Co.'s Brownfield 1, dr 165 ft.

UPTON COUNTY—Gulf Prod. Co.'s Baker 1-B, sd after shot 2270 ft; Sanger 1, run 6⅝ cas 3404 ft; J. H. Shirk 1-E, rig. Bill Dunning's Crier-McElroy 1, dr 2720 ft. Humble Oil & Ref. Co.'s J. T. McElroy 1, sd dry 3900 ft. L. E. Hults et al's Gidding 1, rig. Johnson-McCamey & Atlantic's Shirk 1, rig. Johnson-McCamey et al's Union 1, rig. Marland Oil Co.'s Powell 1, rig; Reese 1, rig; University 1, rig. Rio Grande Oil Co.'s Estep 1, National Machine. Sartain Bros. & Davis' Bull 1, sd on top salt 1660 ft. Skelly Oil Co.'s O. P. Jones 1, elevation 2882 ft, top salt 1761 ft, dr 3180 ft. Texon Oil & Land Co.'s Shirk 1, rig. Texon & Marland Oil Co.'s Halff 1, elevation 2784 ft, top salt 1440 ft, dr 2600 ft. Wentz Oil Corp.'s Shirk 1, re-set cas with packer and estimated 100 barrels oil 2272-2331 ft.

VAL VERDE COUNTY—A. Blume et al's Moore 1, re-set cas 2675 ft. O. O. Owens et al's Mills 1, rig. Hiawatha Oil Co.'s Sellers 1, spd and sd. Independent Operator's Whitehead 1, sd 3710 ft. Plateau Oil Co.'s B. S. Harrison 1, dr 3255 ft. Transcontinental Oil Co.'s Stevenson 1, dr 1800 ft. E. T. Williams et al's W. T. Holman 1, fsh 250 ft.

WINKLER COUNTY — Brandon-McCamey et al's TP Fee 1, dry and plugged 3502 ft. McCullough Oil Co.'s Tobe Martin 1, lcn. Ed. S. Hill & Ladd-Simons' Ambrugey 1, dr 700 ft. Champlin Drilling Co.'s Means 1, lcn. R. S. Matthews et al's Cowden 1, dr 565 ft. Llano Oil Co.'s Scarborough 1, lcn. Taliaferro & Sid Richardson's Sealy 1, dry 3537 ft. R. A. Westbrook & Co.'s Hendricks 1, making ¾ million ft gas, dr sandy-lime and shale 2831 ft. F. P. Zoch et al's John Sealy 1, sd 200 ft.

East Central Texas Wildcats

COMPLETION

Falls County—		
Forbes et al's W. D. Kyser 1.....	*	2908

DRILLING REPORT

BELL COUNTY—R. R. Penn et al's Hardy-Peck 2, top chalk 663 ft, dr 1660 ft.

FALLS COUNTY—Forbes et al's Keyser 1, dry 2908 ft.

FREESTONE COUNTY—J. S. Cosden et al's J. E. Woods 1, dk. Orbit Oil Co.'s F. A. Coleman 1, rig.

HENDERSON COUNTY—Barkley-Meadows et al's Wm. McClung 1, Wm. Carroll sur, rig. Heine et al's Sterrell 1, sd 1162 ft.

LIMESTONE COUNTY — Evangeline Oil Co.'s Sweat-Bass 1, Austin chalk at 2287-2600 ft, cored dry sandy-shale 3137 ft. C. W. Harrison & Pandem Oil Corp.'s Bassett 1, dr 450 ft. W. K. Clayton et al's Joe Thornton 1, lcn. Humble O. & R. Co.'s Gunter 1, near Thornton, Austin chalk 2521-2775 ft, dr cable tools 3085 ft. Killiam & Phillips et al's Montgomery 1, top chalk 2358 ft, dr sandy-shale 3125 ft. Kosse Oil Synd.'s Fenner 1, sd 2905 ft; Jones 1, rig. Oxford Oil Co.'s Riddle 1, near Nigger Creek, fsh 2680 ft. Pure Oil Co.'s Oliver 1, testing gas 1496 ft. E. L. Smith Oil Co. et al's Jake Steubenrouck 1, near Mexia, rig for 5500 ft test.

McLENNAN COUNTY—D. H. Byrd et al's Bruce Duncan 1, rig. Castleman Creek Oil Co.'s Schaerhaur 1, dr 900 ft. Pecan Gap Oil Co.'s Punchard 1, sd 2005 ft.

MILAM COUNTY—Alexander-Lyles et al's Batte 1, top Edwards 3038 ft, sd 3136 ft.

NAVARRO COUNTY — Carrita O. & G. Co.'s E. Trammel 1, rig. J. S. Cosden et al's J. H. Finch 1, spudding. John W. Hooser's J. H. Finch 1, J. Dean survey, lcn. J. C. McNeill et al's Pierce 1, tested water 2069 ft. Sun Oil Co.'s H. A. Swink 3-A, dr 3660 ft. R. R. Penn & Rycade Oil Corp.'s Harrison 1, near Bazette, dr 1910 ft. Lea et al's Kerr 1, dr 1940 ft. The Texas Co.'s Byron Cheney 1, rig.

Coastal Wildcats

COMPLETIONS

Company, Well and Location		Initial Production Bbls.	Depth
Brazoria County—			
The Texas Co.'s Mayes 1	*		1429
Wharton County—			
The Texas Co.'s Felder 2	*		4100

DRILLING EPORT

AUSTIN COUNTY—Valley Oil Co.'s Reese 1, 30 miles N Orchard, no report.

BRAZORIA COUNTY—Roxana Pet. Corp.'s Pabst 1-A, Clemens dome, dr 1638 ft in rock; Clemens Bernard River 1, Clemens dome, lcn; Clemens 3, Clemens dome, dr 2789 ft water sand; Allen 3, Allen dome, dr 3238 ft in sandy lime; Allen Bernard River 1, Allen dome, dr 1109 in sand. The Texas Co.'s Mayes 1, Rattlesnake Mound, abn 1429 ft in water sand; Mayes 2, 1500 ft W No. 1, lcn.

CHAMBERS COUNTY — Patillo Higgins' Fee 1, Barbers Hill, set 10-inch cas 950 ft. Osage Oil Co.'s State 1, 5 miles S of Moss Bluff, dr 3390 ft in gumbo.

FORT BEND COUNTY—Gulf Prod. Co.'s Davis 15, Long Point, dr 3410 ft in hard lime. The Texas Co.'s Farmer 1, Boling, dr 4275 ft in sandy shale. Sun Co.'s Farmer 1, Boling, fsh 1988 ft.

GOLIAD COUNTY — Houston Oil Co.'s Parks 2, near Goliad, no report; Pettus 2, near Goliad, dr 2887 ft in hard shale and lime.

JACKSON COUNTY—L. E. Norton's Fenner 1, C. O. Fenner 676-acre tract, no report.

JEFFERSON COUNTY—Gulf Prod. Co.'s Bordages 2, Fannette, sdtr 4000 ft after sticking drill stem 5119 ft; Thomas 9, Fannette, dr 3600 ft, hard sand rock. Port Arthur Development Co.'s West 4, Westbury, testing at 1846 ft in sandy shale. New Beaumont Oil Co.'s Garrick 1, Beaumont, sd 2600 ft. J. D. Brooks' Young 1, 5 miles S of Spindletop, 1516 ft in shale, corrected depth.

LIBERTY COUNTY — Humble O. & R. Co.'s Welder 3, Liberty extension, pulling screen to deepen 3455 ft; Welder 4, Liberty extension, wt on cement to set for test, oil sand 3532-40 ft. Gulf Prod. Co.'s Beckman 1, Liberty extension, set 6⅝-inch cas 3710 ft in gumbo. Sun Co.'s Chambers 1, Moss Bluff, dr 1429 ft in water sand.

MATAGORDA COUNTY—Gulf Prod. Co.'s Co.'s Parkinson 1, Hawkinsville, dr 4420 ft in sandy shale.

WHARTON COUNTY — The Texas Co.'s Felder 2, Boling dome, abn 4100 ft in lime and shale. Rich-Humphrey's Malone 1, 5 miles W of Wharton, washed to bottom 1841 ft.

CAMERON PARISH — Humble-Sun Co.'s Peterson 1, Johnson's Bayou, dr 4497 ft in shale.

San Antonio Wildcats

BEAR COUNTY—B. F. Thompson Wietes 1, dr at 785 feet oil show at 765 feet.

DUVAL COUNTY — Associated Oil Co.'s Sutherland 1, dr; Benavides 1, dr. Barkley-Meadows-Morgan's King Harper 2, dr in; King Harper 3, lcn. Buffum et al's blk 38, Mesquite ranch, dr; J. Benavides 1, preparing to dr. Humble Oil Co.'s Dowdy 1, dr; Schallert 7, dr; Walsh 7, ru; Becker 1, sur 531, set cas at 3118, preparing to test. O. W. Killam's Lopez 3, sec 6, blk 9, lcn; Lopez 4, 5, and 6, blk 18, sec 319, lcns. Magnolia Pet. Co.'s Spear 1, dr. Maurer & Duggan's Hoffman 1, dr. Simms Oil Co.'s Schallert 1, sec 241, plugging. Texas Co.'s No. 1, sur 668, set cas at 2520 ft.

GUADALUPE COUNTY — J. M. Davis' Payne, Bond & Shaw 1, dr; Rosenbrook 1, dr. Texas Co.'s Glenwinkle test, dr at about 400 ft. Wildman & Blackwell's Smith 1, dr.

MEDINA COUNTY—Armstrong's Lacey 1, dr below 330 ft. Arnett Oil Co.'s Nixon 4, pulled cas, resetting for a new test. California-Medina Co.'s Rothe 1, dr. Golden West Oil Co.'s Courand 1, dr. Ina Oil Co.'s Finger 1, dr 950 ft. Kittle & Townley's Bendle 1, dr. Rand et al's No. 1, dr. Witherspoons Oil Co.'s Adams 1, prod. 65 million cu. ft of gas. Western Gas & Fuel Co.'s Adams 1, dr at 1200 ft. Walsh et al's Saathoff 1, dr. Yeager et al's No. 1, dr.

STARR COUNTY — Southern Exploration Co.' Fee 1, dr.

ZAPATA COUNTY—Killam's No. 1, sur 307, dr. Maurer & Dugan's sur 123 of Cuellar Grant, plugged at 1414 ft. Malone & Burns' Bissonet 1, moving on tools. Trees Oil Co.'s Benavides 1, standing. Texas Company's Jennings 3, dr below 4000 ft. W. R. Duke's (Evangeline Oil Co.) No. 1, in the Charco Rendendo, preparing to spud in.

Julian Petroleum Buys Superior Company

Los Angeles, Calif.—Negotiations have been completed whereby Julian Petroleum Corporation acquires the entire outstanding stock of the Superior Oil Company, it was announced October 9. The acquisition, which was effective October 1, involves more than $7,000,000.

As a result of the deal, about 7600 barrels of settled production have been added to Julian's resources. The new production comes from 76 wells.

According to the agreement, officials of the Superior have placed 60 per cent of the outstanding stock in escrow. For this the Superior will receive one dollar per share. The same offer will be made to holders of other Superior stock, according to Henry Anchester, representative of New York banking interests, who is understood to have played a prominent part in the negotiations.

In addition to the settled production

Elliott-Alco smashes record in Maracaibo

LAGO PETROLEUM CORPORATION
APARTADO 106
MARACAIBO VENEZUELA

Ambrosio Field,
June 17th, 1926.

Mr. J. B. Elliott, President,
Elliott Core Drilling Co.,
Los Angeles, Cal.

Dear Sir:

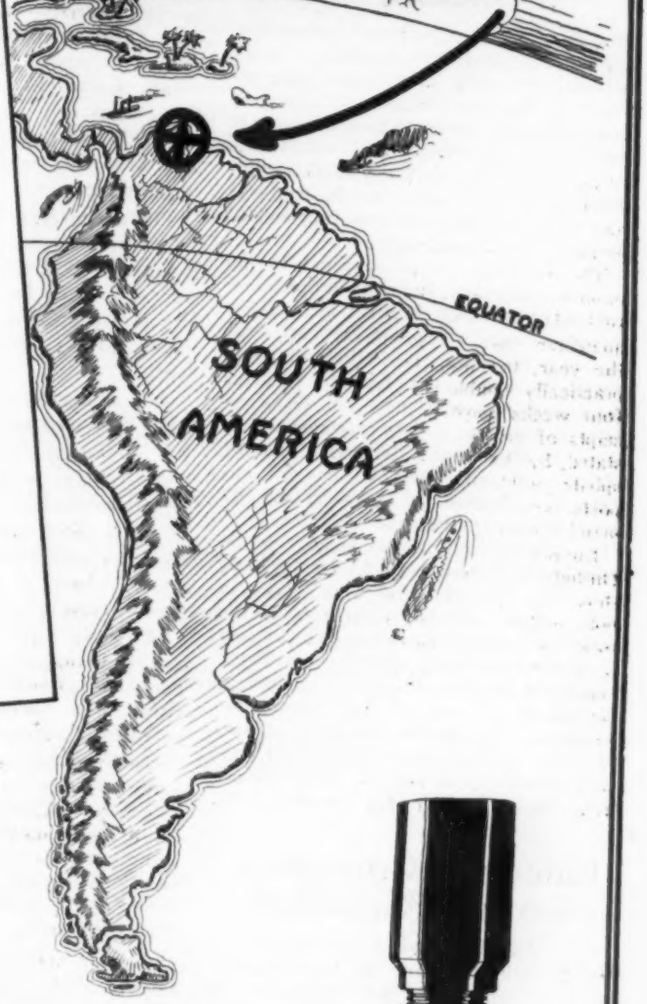
I refer to your paper on the Elliott core drills, included in the volume "Petroleum Development & Technology in 1925" of the A.I.M.E.

In this you state that, so far as you know, the record for the Elliott Alco core drill was made by its having cut 180 feet of hole, without resharpening, and extracting 144 feet.

I am certain you will be interested to know how far that record has been surpassed in this field by the same type of core drill. The factory head cored 175 feet (from 750' to 925') extracting 100% of the core. At this depth 8-1/4" casing was cemented, and the same head was resharpened and built up with Stellite, and cored from 927' to 1157', a depth of 230 feet, extracting 201 feet of core. The 29 feet of core was lost because of the extreme softness of the formation. The entire distance cored was a formation of soft shale and sand.

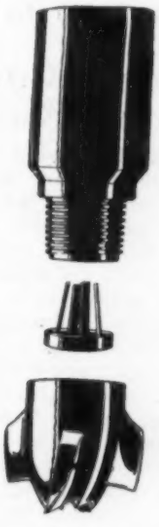
Yours very truly,

Thomas I. Dickson
Drilling Superintendent.



THE only improvement over making records is breaking them, "Elliott-Alco" Core Drills made both records mentioned in this letter.

In any field, in any formation, you can depend upon "Elliott-Alco" Core Drills one hundred per cent.



ELLIOTT CORE DRILLING COMPANY

850 Subway Terminal Building,
Los Angeles, Calif.

Branch: 3210 Harrisburg Blvd., Houston, Texas
123 East Third St., Tulsa, Okla. — 618 Lake St., Shreveport, La. — Wichita Falls, Texas

contributed by the Superior, this company has 17 wells under way in the newly opened townsite district of Huntington Beach, which should contribute at least 8000 barrels more to the Julian's daily output, according to showings made by current completions in the townsite area.

Consumption of the Julian-Superior deal means that the California Eastern Company, parent concern to the Julian, which acquired the Superior prior to its amalgamation into the California Eastern, will have a daily production of about 36,000 barrels.

British Petroleum Imports Largely Increased

Washington, D. C.—British imports of petroleum products are showing a heavy increase, according to a report just received at the Department of Commerce from the American trade commissioner at London, totaling for the four weeks ended September 6 more than 216,000,000 imperial gallons, a considerable increase over those for any previous four-weeks' period of the current year.

The increase is most apparent in the imports of gasoline, kerosene and gas and fuel oils, which were brought in in larger quantities than in any similar period of the year, the imports of fuel oil being practically double the highest previous four weeks' importations. The large receipts of gasoline can be explained, it is stated, by the seasonal demand for motor spirits, while the fuel and gas oil imports are reflections of the increased demand created by the coal strike.

Imports fo petroleum products from the United States increased considerably over those for the preceding four weeks in both volume and in percentage of the total, this country furnishing 98.6 per cent of all the lubricating oil imported, 68 per cent of the gasoline, 41 per cent of the gas oil and 29 per cent of the fuel oil and kerosene. Considerable quantities of fuel oil were received from Mexico, Persia and Curacao, and gas oil was received from Russia for the first time this year.

California Company Grows at Rapid Rate

Los Angeles, Calif.—Operations of United Oil Company of Los Angeles and its successor, the Richfield Oil Company of California, are increasing in scope to such an extent as to make the company's development one of the outstanding features in the history of California's oil industry.

Its sales campaign and results of hat campaign are little short of phenomenal. The company, which not long since, occupied last place among the major oil distributors of California, now ranks third. Securities of the company have steadily risen in value with the growth of United and in September, 1926, stock had reached a high of 82 on the Los Angeles exchange, whereas in 1923 it sold as low as 19.

Union and Pantepec to Organize Corporation For Venezuelan Development

Los Angeles, Calif.—Paul M. Gregg, counsel, Union Oil Company of California, accompanied by Roderick D. Burnham manager of lands for the Union, left for New York City October 9th to confer with officials of the Venezuelan Pantepec Petroleum Company on the formation of a corporation or operating company which will develop on a fifty-fifty basis approximately 900,000 acres of Pantepec holdings in Venezuela.

Under terms of an agreement recently entered into by the Union and the Pantepec Company, the Union agrees to spend $3,500,000 in development, the actual work to be done by the corporation or operating company yet to be formed. Mr. Gregg and Mr. Burnham will try to bring this operating company into being.

The corporation when organized will be under the management of Union Oil Company of California, but close cooperation will be maintained between the Pantepec and Union, especially in regard to the title, land and geological work.

Actual development work which has been held up pending the formation of the operating company will start as soon as it is possible to get materials on the ground, according to Union Oil officials. Roderick Burnham, who handled the preliminary negotiations, will go to Venezuela soon from New York to supervise the start of operations.

With the right to develop this acreage in Venezuela, the Union Oil Company has placed itself in a strong position in a country that has immense petroleum potentalities.

Holdings of the Pantepec Petroleum Company are rated among the most valuable in Venezuela. They are scattered over both the eastern and western oil area of the country, and in practically every instance they adjoin properties being actively developed by the major American oil companies.

A summary of the results of the Union Oil Company's operations for the nine months ended September 30, 1926, and the financial position as of that date, follows:

Earnings from all operations, less general expenses, taxes, interest charges and provident fund were:

	1926	1925
Profit subject to depreciation, etc.	$18,850,000	$17,425,000
Provision for:		
Depreciation and depletion	5,600,000	5,275,000
Labor and incidental cost of new drilling	3,500,000	3,400,000
	$ 9,750,000	$ 8,750,000

Production of crude oil by the company and controlled companies for the nine months approximates 11,140,000 barrels, about equal to the production for the same period last year. During the nine months 32 new wells were placed on production in Southern California fileds, 10 in Colorado and one in Wyoming, with a combined initial production of 21,500 barrels.

Sales approximate $50,9900,000, an increase in value of $4,150,000.

Capital expenditures approximating $12,300,000, consist chiefly of field development work, additions to gas compression facilities in Southren California fields, also cracking units and improvements and additions to refineries. Fifteen new 80,000 barrel capacity steel tanks have been erected. During the nine months 26 distributing stations were opened for business of which four were in Alaska, 15 in Canada, one in Mexico and six in Pacific Coast states.

Current assets, consisting of cash, United States Government bonds and treasury certificates, accounts and bills receivable, oil inventories and materials and supplies at September 30, 1926, approximated $55,000,000, or about the same as at December 31, 1925. Current assets are over six to one of current liabilities. Oil in storage approximates 17,800,000 barrels.

Current liabilities at September 30, 1925, approximated $8,500,000, an increase of $750,000 over December 31, 1925. During the nine months there has been a decrease in mortgage debt in the hands of the public of $1,750,000, making a net decrease in combined indebtedness of $1,000,000.

Regular quarterly dividend of 50 cents per share was declared on October 7th payable on November 10th. 1926, to stockholders of record at the close of business October 16th, 1926. The stock transfer booksof the company will not be closed.

The above statement was issued October 9 by W. L. Stewart, president and R. D. Matthews, comptroller.

Marland Plans Campaign In New Mexico

Santa Fe, N. M.—The Marland Oil Company is planning to enter Southeastern New Mexico on a large scale, according to reliable reports received here. The company has been in touch with the district for several years, but has never waged an aggressive development campaign. Scouts for the company have covered the region, while geologists have recommended that several tests be made.

Honest service at an honest price is an American policy responsible for much of America's industrial leadership. A fair price permits experiment and research; experiment and research lead to discovery and development.

In the establishment of the highest and most scientific type of oil well cementing, Halliburton has spent over $200,000 a year for new improvements and research.

—ERLE P. HALLIBURTON.

HALLIBURTON OIL WELL CEMENTING CO.
Duncan, Oklahoma

PERMITS GRANTED FOR NEW WELLS

Weekly Comparison of New Wells

Following is a condensed table giving a comparison of permits or locations made for new wells during the past year in Kansas, Oklahoma, Arkansas, Louisiana, Texas and California:

	Mar. 1926	Apr. 1926	May 1926	June 1926	July 1926	Aug. 1926	Sept. 1926	Oct. 1	Oct. 8
Arkansas	106	124	103	100	107	65	62	15	12
California	116	135	79	69	80	103	106	30	34
Louisiana	145	150	109	107	141	93	113	13	24
Kansas	160	170	156	161	143	119	124	31	16
Oklahoma	419	593	471	411	522	396	398	63	88
Texas	817	1070	941	124	108	106	101	24	8
Mountain States	...	...	113	1168	1468	1073	1021	276	207
Total	1763	2242	1972	2149	2569	1955	1905	452	389

CALIFORNIA

Fesno County—Associated Oil Co.'s No. 1, 36-13-16.

Huntington Beach—Julian Pet. Corp.'s Weide 1, 10-6-11; Campbell 1, 10-6-11. Standard Oil Co.'s Huntington H-12; Huntington H-11, 10-6-11; Huntington H-14, 10-6-11; Huntington H-15, 10-6-11. Wilshire Oil Co., Inc.'s H-B 5, 10-6-11; H-B 6, 10-6-11; H-B 7, 10-6-11; H-B 8, 10-6-11. Ambassador Pet. Co.'s H-B 10, 10-6-11; H-B 10-6-11. United Oil Co.'s Van 1, 10-6-11. Wilshire Oil Co., Inc.'s H-B 9, 10-6-11; H-B 10, 10-6-11. Painted Hills Oil Assn.'s No. 11, 10-6-11.

Inglewood—Standard Oil Co.'s Baldwin 41, 17-2-14. Sunrise Oil Co.'s Phil Young, Jr. 1, 18-2-14.

Kern County—Union Oil Co.'s Mack 1, 5-27-28.

Long Beach — Reliance Home Investment Co.'s No. 3, 13-4-13.

Midway—Hagar, Denniston & Jones' No. 1, 16-31-22. Honolulu Cons. Oil Co.'s No. 8, 8-32-24; No. 59, 8-32-24.

Montebello—Standard Oil Co.'s Whitehead Comm. 1, 3-2-12. Baldwin 61-A, 2-2-12.

Richfield — Union Oil Co.'s Yorba Linda Group 12, 33-3-9.

San Diego County—Torrey Pines Oil Co.'s No. 1, 18-14-3.

Santa Fe Springs—General Pet. Corp.'s Santa Fe 23, 5-3-11.

Santa Barbara County—West Penn Producing Co.'s Shields 2, 8-31.

South Mountain—Oak Ridge Co.'s Harvey 20, 13-3-21. Santa Paula Oil Co.'s No. 21, 18-3-20.

Ventura—Shell Co.'s Edison 11, 28-3-23. General Pet. Corp.'s Notten 11, 28-3-23.

MOUNTAIN STATES

COLORADO

Texas Production Co.'s No. 5, Lot 7, 10-4-91. Foley & Goldwarthy's No. 1, NW¼ 11-30-60.

NEW MEXICO

Ohio Oil Co.'s No. 1, 24-7-29.

WYOMING

Producers & Refiners Corp.'s No. 1, 21-21-86. Continental Oil Co.'s No. 22, SW¼ 32-40-78.

MONTANA

Dunkirk Oil Corp.'s No. 1, NE¼ 17-31-1w. Pan-Canadian Oil Co.'s No. 2, SW¼ 35-35-2w. Claggett Development Co.'s No. 1, SE¼ 27-22-15e.

KANSAS

Butler County—Allison and Fitzwilliams No. 1 Pierce, northeast corner of the northwest of the northeast of 28-25-4. Empire Gas & Fuel Company No. 4 Blankenship, northwest corner of the southeast of the northwest of 23-26-7. Reynolds et al No. 1 Colbert, southwest corner of the southeast of the northwest of 36-27-5.

Chase County—Preston and Pasewalk No. 3 Lipps, center of the northeast of 27-18-7.

Coffey County—Derby Oil Company No. 2 Shankie, southwest corner of the northwest of 8-22-14.

Greenwood County—Ritchey & Moore No. 1 Pixlee, northwest corner of the northeast of the southeast of 7-22-10. Simmons et al No. 4 Clopton, northeast corner of the southwest of the northwest of 18-22-11. Empire Gas & Fuel Company No. 2 Garth, northeast corner of 22-22-11. The Texas Company No. 1 Swanson, center of the north line of the northwest of the southeast of the northwest of 9-22-12. Manhattan Oil Corporation and Phillips Pet. Company No. 2 Edwards, southwest corner of the southeast of the northwest of 16-23-11. Kismet Oil Company et al No. 1 Bock, southeast corner of the southwest of the northwest of 14-23-13. McGinnis et al No. 7 Wiggins "A," northwest corner of the southeast of the southwest of 30-24-11. Theta Oil Company No. 2 Rochill, southwest corner of the northwest of the northwest of 31-24-11. Nathan et al No. 1 Erickson, northwest corner of the northeast of 1-25-8. Farr and Farrell No. 1 Willis northeast corner of the northwest of the northeast of 33-25-12.

Lyon County — Theta Oil Company No. 6 Jones, southwest corner of the northwest of 30-21-10.

OKLAHOMA

Caddo County — Briscoe and Hall No. 3 Lacky, southeast corner of the southwest of the northwest of 11-5n-9w.

Carter County—Humble Oil Ref. Company No. 2 Richards, northwest corner of the southwest of the southeast of 3-2s-3w; No. 3 Richards, southeast corner of the southwest of the southeast of 3-2s-3w. Magnolia Pet. Company No. 2 Carpenter, northwest corner of the northeast of 3-2s-3w. C. R. Smith No. 6 Fee, northeast corner of the southeast of the northeast of 17-2s-3w. Cameron Ref. Company No. 1 Westheimer, northwest corner of the northeast of the northwest of 8-4s-1w. Amerada Pet. Company No. 10 Criner, northwest of the southwest of the northeast of the northwest of 20-5s-1e.

Creek County—Gled Oil Company No. 6 E. Ross, northwest corner of the southeast of the southwest of 13-19-8. The Texas Company No. 4 Weaver, southwest corner of the northwest of the southeast of 13-19-8; No. 5 Weaver, southwest corner of the southeast of 13-19-8. Silurian Oil Company No. 29 Keim, northwest corner of the southwest of the southwest of the southwest of 8-18-7. C. G. Tibbens No. 1 Jefferson, southeast corner of the northeast of the northwest of 25-15-8. Sherry and Holmes No. 1 Williams, southwest of the southeast of the northeast of 5-18-10. Gypsy Oil Company No. 16 Richards, northwest corner of the northeast of the northwest of 1-18-11; No. 17 Richards, northeast corner of the northwest of the southeast of the northwest of 1-18-11. Mid-Continent Pet. Corporation No. 3 Strip, northwest corner of the northeast of the southeast of the northwest of 1-18-11. Riverland Oil Company No. 4 Land, southeast corner of the northeast of the northwest of the northwest of 1-18-11. J. H. Wright No. 12 Tahkaney, southwest corner of the northeast of the northwest of 24-17-10. T. Green et al No. 2 Coll, sauthwest corner of the northeast of the southwest of 34-17-10. Shaffer Oil & Ref. Company No. 7 Wacoche, center of the east line of the northeast of the northeast of 17-17-11. Cumberland Pet. Company and Kuselman No. 1 Meyer, southwest corner of 18-17-11. Independent Oil & Gas Company No. 1 Yellowhead, northwest corner of 4-16-10. Atlantic Oil Producing Company No. 2 Tiger, old well deepened, northwest corner of the southwest of the northeast of 16-14-10. Wilcox Oil & Gas Company No. 3 Dixon, northeast corner of the northwest of the southeast of 18-14-10. Independent Oil & Gas Company No. 2 Bear, north east corner of the southwest of the northwest of 29-14-10.

Grady County—Hamon and Cox No. 1 Smith, northwest corner of the southwest of the northwest of 16-3n-5w. Marland Oil Company No. 2 Burke, southwest corner of the northwest of 16-3n-5w; No. 1 Burks, southeast corner of the northeast of 17-3n-5w. Carter Oil Company No. 1 Ray Horton, southwest corner of the southeast of the northwest of 8-3n-5w; No. 2 Adair, northwest corner of the southeast of the northwest of 27-3n-5w; No. 3 Polson, southeast corner of the north east of the southwest of 27-3n-5w. Clark and Cowden No. 2 Kilgore, northwest corner of 27-3n-5w. Magnolia Petroleum Company No. 1 Ramsey, southwest corner of the northwest of the southwest of 27-3n-5w. Briscoe and Hall No. 4 Nation, southwest corner of the northwest of the southeast of 34-3n-5w; No. 4, Wham southeast corner of the northeast of 34-3n-5w; No. 4 Lindsey, southeast corner of the northwest of the southwest of 35-3n-5w; No. 5 Lindsey, southwest corner of the northwest of the southwest of 35-3n-5w; No. 1 Zachary, northwest corner of the southwest of the northwest of 35-3n-5w; No. 2 Cross, northwest corner of southwest of 35-3n-5w; No. 2 Sahm, northeast corner o fthe southwest of the northwest of 35-3n-5w.

Hughes County—T. B. Slick No. 1 Anderson, northwest corner of the northeast of 30-9-9. Furhman and Newman No. 1 Buck, southwest corner of the southeast of 21-9n-10e. Twin State Oil Company No. 1 Jacobs, southwest of the southeast of the southeast of 11-7-8.

Jefferson County—J. S. Armour No. 1 Seay, southwest corner of the southeast of the southwest of 28-6s-5w. Gypsy Oil Company No. 35 Seay, northwest corner of the southeast of 33-6s-5w; No. 36 Seay, southeast corner of the southwest of the northeast of 33-6s-5w.

Kay County—Comar Oil Company No. 4-w Brown, southeast corner of the southwest of the southeast of 16-29-1w. Harris & Hahn No. 4 Frost, southwest corner of the northwest of the northwest of the northwest of 22-29-1w.

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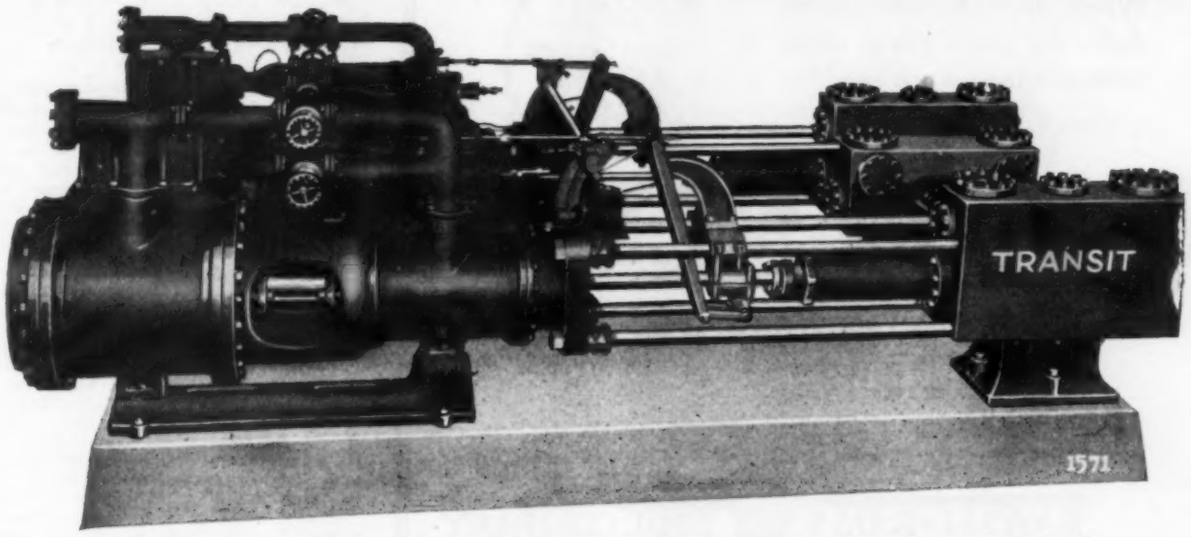

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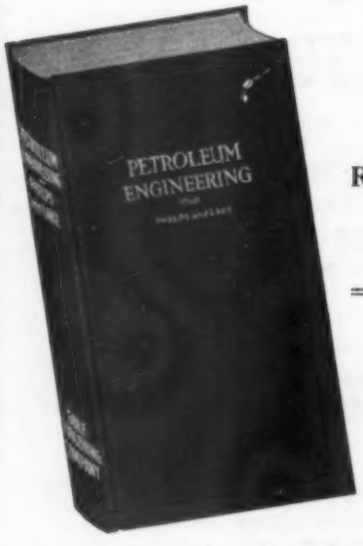

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Petroleum Engineers

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Polling & Denny, No. 5 Burkholder, southwest corner of the northeast of the northwest of 9-27-1w.

Muskogee County—C. M. Whaley et al No. 1 A. Rector, southeast corner of the northwest of the southeast of 8-15-17. Parafine Oil Company No. 1, E. Sango, center of the north line o fthe northwest of the northeast of 20-15-17.

Okfuskee County — Atlantic Oil Producing Company No. 1 Wind, old well deepened, southeast corner of the southwest of the northeast of 35-11-9. E. L. Robinson, No. 1 Berryhill, northeast corner of the southwest of 35-11-9. Atlantic Oil Producing Company No. 3 Jackson, center of the west line of the northwest of the southwest of 35-11-11.

Okmulgee County — Sheridan Oil Company, No. 1 Barnett, southeast corner of the southwest of 28-16-11. J. J. Schock No. 1 Kimble, southwest corner of the northeast of 23-15-11. W. B. Pine No. 1 Bighead, northwest corner of the southeast of the southeast of 9-15-12. Devonian Oil Company No. 2 Adams, center of the northeast of the northeast of 4-14-12. W. L. Kistler et al No. 5 West, center of the east line of the northeast of the northwest of 3-11-12. C. O. Buckles No. 18 Jackson, northwest of the southwest of the northwest of 5-11-12. Custer Oil Company No. 7 N. Harrison, southwest corner of the northeast of the southwest of 19-15-14. McCulloch Oil Company No. 8 S . Barnett, center of the northeast of the northeast of the northeast of 21-15-14.

Osage County—Mid-Continent Pet. Corporation No. 1, southeast corner of the northeast of 10-25-7. Lewis Oil Company No. 7, northeast corner of the southwest of the northeast of 30-25-8. Devonian Oil Company No. 3, southwest corner of the southeast of the southwest of 25-25-11. Carter Oil Company No. 4, center of the east line of the southeast of 6-24-8. Twin State Oil Company No. 9, northeast corner of 13-23-8. Devonian Oil Company No. 2, northwest corner of the southwest of the northwest of 30-21-10. Gillespie & Sons No. 8, southwest corner of the northeast of 5-20-12.

Pawnee County — Minnehoma Oil Company No. 10 Mullendore, center of the north line of the northwest of the northwest of 24-21-7; No. 11, Mullendore, center of the east line of the northwest of the northwest of 24-21-7. Magnolia Petroleum Company No. 1 Vogler, old well deepened, southwest corner of the northeast of 32-0-6; No. 4 Vogler, southwest corner of the southeast of the northeast of 32-0-6; No. 1 L. Vogler, southwest corner of the northeast of the northeast of 32-20-6. Twin State Oil Company No. 3 Salle, northwest corner of the northeast of the southeast of 32-0-6. Shaubel and Breslyn No. 2 H. B. Cotton, northwest corner of the southwest of the northeast of 6-20-6.

Seminole County — Mid-Continent Pet. Corporation No. 6 Tayoche, twin, northwest corenr of the southeast of the southwest of 24-9-6. Tidal Oil Company No. 5 Mahardy, twin, northwest of the northeast of the southwest of 249-6; No. 6 Mahardy, twin, southwest of the northeast of the southwest of 24-9-6. Barnsdall Oil Corporation No. 1 Kepeya, northwest of the northeast of the southwest of 7-9-7. Independent Oil & Gas Company and Atlantic Oil Producing Company No. 5 D. A. Long, twin, northeast corner of the southwest of the northeast of 32-8-8.

Tulsa County — Superior and Swift No. 2 Burnett, northwest corner of the northeast of the northwest of 7-19-10. Riverland Oil Company No. 3 Anderson, center of the north line of the southwest of the northwest of 34-19-11. Haas and Gledden No. 1-A Unallotted, center of the east line of the northwest of the northwest of 36-19-11. Wood and Williams No. 2-A Franklin, southwest corner of the southeast of the southwest of 36-19-11. W. O. Dickinson et al No. 5 Hayden, southeast corner of the northwest of 12-16-13.

Wagoner County—W. O. Dickinson No. 3 W. Kelly, twin, northeast corner of the northwest of the northeast of 6-17-15. Swanson Brothers No. 1 McIntosh, old well deepended, northeast corner of the southwest of the northeast of 2-17-16. Sevreda Oil Company No. 1 Taylor, northwest corner of the southwest of 20-16-15.

ARKANSAS

Miller County—Lenze et al's Dale 2, 28-15-26, SWc of section.

Nevada County—Wright et al's Groves 2, 12-15-21, 150 ft S and W of NEc NW¼ NW¼. Furen et al's Fuller 1, 6-13-21, SEc NE¼ SE¼.

Ouachita County—Ohio Oil Co.'s Cramer 19, 27-15-16, NW¼ NW¼, rig. Standard Oil Co.'s Umstead 24, 32-15-15, 200 ft S and 50 ft E of NWc NE¼ SE¼.

Union County—Clark & Greer's LeCroy 1, 6-18-15, SWc N½ SE¼ NE¼. Federal Pet. Co.'s Wells B-6, 15-16-15, 200 ft S and 395 ft W of NEc SE¼ NW¼. Lion O. & R. Co.'s Werner 1, 21-17-16, NEc SE¼ SW¼. Louisiana Oil Ref. Corp.'s Murphy B-1, 9-16-15, NW¼ SE¼. Ohio Oil Co.'s Stock 4, 21-17-16, 660 ft W and 330 ft N of SEc W½ NE¼ SW¼. Southern Crude Oil Purch. Co.'s Hill 1, 5-18-13, NWc NE¼ SE¼. Wingfield et al's Morrison 1, 3-19-13, SWc SW¼ SE¼.

LOUISIANA

Bienville Parish—C. A. Kimbrough, Castor, C. W. Carlisle 1, 27-15n-8w, 150 ft S and 150 ft W of NE corner of NW¼ of SW¼.

Caddo Parish—Bayou State Oil Corp., 1008 Slattery Bldg., Shreveport, Peak 24, 23-22n-15w, 835 ft W and 700 ft N of SE corner of SE¼ of NE¼. A. C. Glassell, et al, 601 City Bank Bldg., Shreveport, Hammock 1, 34-18n-16w, 371.25 ft S and 540 ft E of NW corner of SW¼. R. J. Howard et al, Vivian, Pyron 1, 15-21n-15w, 330 ft S and 330 ft W of NE corner of section. Magnolia Pet. Co., Slattery Bldg., Shreveport, Waterman Lbr. Co. 1, 18-17n-16w, 950 ft S and 1350 ft E of NW corner of fraction section 18. The Ohio Oil Co., Giddens-Lane Bldg., Shreveport, Caddo Levee Board 1, 28-23n-16w, 330 ft N and 330 ft E of center of section. Standish Oil & Ref. Co., 6 Beacon St., Room 711, Boston, Mass., Allen 9, 23-22n-15w, 150 ft N and 300 ft E of SW corner of SE¼ of NW¼; Allen 10, 23-22n-15w, 100 ft E and 150 ft N of SW corner of SE¼ of NW¼.

Calcasieu Parish — Calcasieu Oil Co., Inc., Sulphur, Barbe 1, 2-9s-8w, 1740 ft S and 1430 tf W of NE corner of section.

Claiborne Parish—E. A. Underwood et al, care of C. W. Underwood, Homer, Bullock 1, 2-20n-7w, 400 ft S and 140 ft W of NE corner of NE¼ of SE¼.

Jackson Parish—Louisiana Pet. Corp., 208 Ricou-Brewster Bldg., Shreveport, Davis-Theus 2, 12-16n-4w, 200 ft N and 200 ft E of SW corner of section;(corrected lcn) Davis Theus 1, 19-16n-3w, 200 ft N and 200 ft W of SE corner of NE¼.

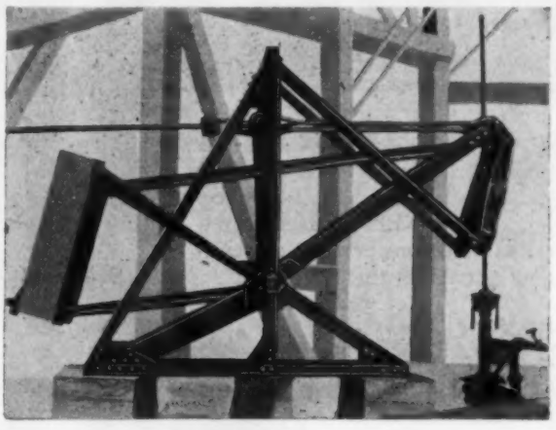
Natchitoches Parish—Humble Oil & Ref. Co., Houston, Texas, C. H. Pierson 1-A, 46-8n-6w, 1850 ft E and 2800 ft S from NW corner of section.

La Salle Parish—Louisiana Oil Ref. Corp., Shreveport, Tremont Lbr. Co. B-36, 25-10n-1e, 150 ft S and 150 ft W of NE corner of SW¼ of NE¼. Oil Operators Trust Co., 1809 F. & M. Bank Bldg., Ft. Worth, Urania 7, 7-10n-2e, 600 ft S and 55 ft E of NW corner of SE¼. Mrs. Joyce Richardson, Garrett Hotel, El Dorado, Ark., Hatfield 1, 7-10n-2e, 50 ft N and 40 ft W of SE corner of NW¼ of NE¼. Tunica Pet. Co., 901 Commercial Bank Bldg., Shreveport, L. & A. Oil Co. 14, 29-7n-3e, 330 ft N and 330 ft E of center of section; L. & A. Oil Co. 15, 7-8n-2e, 330 ft S and 330 ft W of NE corner of SE¼.

Ouachita Parish—New Process Carbon Black Co., 809 Ouachita Bank Bldg., Monroe, Cole 8, 35-20n-4e, 1442 ft S and 472 ft E of NW corner of NE¼.

Webster Parish—Magnolia Pet. Co., Slattery Bldg., Shreveport, J. Tiner 4, 21-21n-10w, 330 ft S and 330 ft E of NW corner of SE¼ of NW¼; B. M. Turner 4, 21-21n-10w, 330 ft S and 330 ft W of NE corner of SW¼ of NW¼.

Winn Parish—Humble Oil & Ref. Co., Houston, Texas, Grant Lbr. Mfg. Co. 1-A, 28-9n-3w, 330 ft N and 330 ft E of center of section; L. & A. Oil Co. 15-A, 26-10n-2w, 1520 ft E and 660 ft S of center of section. J. C. Long, Colvin Hotel, Winnfield, J. B. Milam 1, 28-13n-3w, 150 ft S and 870 ft E of NW corner of section.



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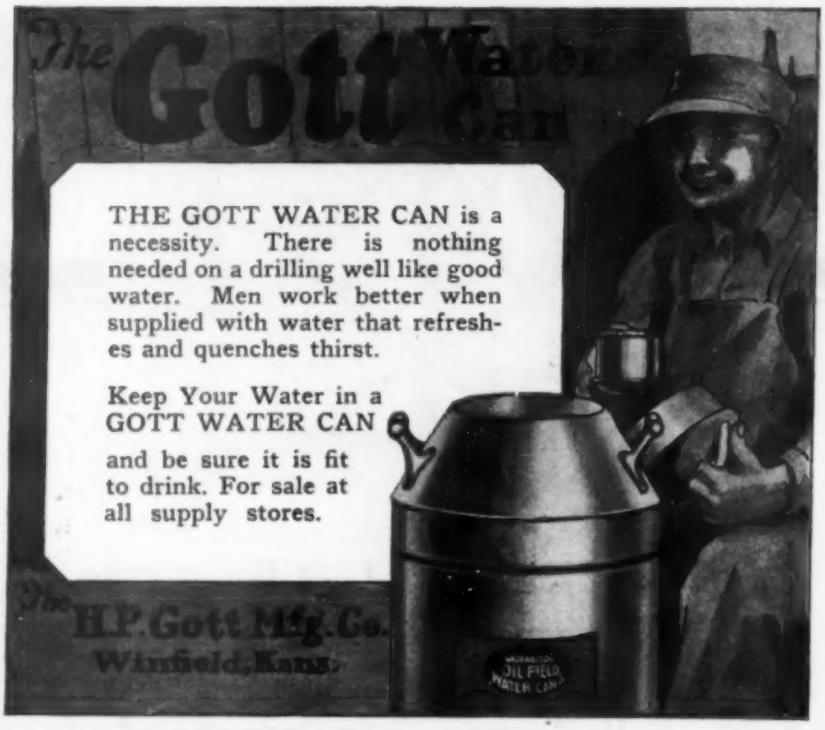
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Ranger	Okmulgee	Webb City

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TEXAS

Archer County—Marland Oil Co., Ft. Worth, W. H. Thomas 5A, N. Thomas sur, 150 ft to N and W lines; 6A, SE of 5A in cen; Turbeville 9, S 172, R. Carson sur, 300 ft W of No. 8; 8, 486 ft to N and 150 ft to E line. The Texas Co., Wichita Falls, Turbeville 1D, R. Carson sur, 171 450 ft to N and 150 feet to W line; 2 B 145, R. Carson sur, 150 ft to N and W lines. L. T. Burns, Wichita Falls, Turbeville A2, B 171, R. Carson, sur, 150 ft to N & W lines; 5, B 24, JCSL, sur, 565 ft to N and 816 ft to E line. Plains Prod. Co., Wichita Falls, Turbeville 4, Carson sur, B 171, 300 ft S of No. 2; 3, 300 feet S of No. 1; 2, 300 ft E of No. 1. Golding & Cochran, Wichita Falls, F. B. Smith 1, W. Ainsworth sur, 750 ft to S and 150 ft to E line: M. L. Morrison 2, B 16, Craw. Past. sur, 150 ft to S & W lines. The Texhoma Oil & Ref., Wichita Falls, Moritz-Phillips 2, S 6, BBB CRR sur, 150 ft to W and 750 ft to S line. W. H. Thomas 3, N. Thomas sur, 150 ft to E and 1095 ft to N line; C. Parrish 1, SPRR sur, 150 ft to S and W lines. C. O. Moore, et al, Cross Plains, W. P. Harmonson 1, J. B. Hines sur, 150 ft to S and 1200 ft to E line. Schermerhorn Oil Co., Cosden Bldg., Tulsa, Okla., H. O. Prideaux 2, J. Dorsey sur, B 25, 150 ft to E and 300 ft to S of well. Pandem Oil Corp., Wichita Falls, L. L. Hudson 6, B 80 J. W. Harris sur, 300 ft E of No. 4. B. F. Mix, et al, Wichita Falls, L. F. Wilson 1, lot 1 B 89, ATNC sur, 300 ft to N and 150 ft to W line. Roxana Pet. Corp., St. Louis, Mo., C. L. Abercrombie 7, S 2, SP RR sur, 435 ft E of No. 6. Bridwell & Heydrick Oil Co., Wichita Falls, Abercrombie 3, S 2, SP RR sur, 150 ft to N and W lines. Consolidated Oil Co, et al, Wichita Falls, Turbeville 3, R. Carson sur, B 146, 300 ft S of No. 2. Murchison & Fail Oil Co., Wichita Falls, J. R. Parkey 1, B 37, DSCL sur, 150 ft to S and 990 ft to W line. More & McVela, Holliday, Abercrombie 1, B 15, J. W. Harris sur, 45 ft to N and 509 ft to E line. Humble Oil & Ref. Co., Wichita Falls, L. B. Hamilton 18, lot 1, I. Holman sur, 300 ft N of No. 17. Wichita Pro. Co., Wichita Falls, L. Bearden 1, J. McLyman sur, 150 ft to W and 600 ft to S line. Red Hill Pet. Co., Amarillo, Puckett 1, S 3, Hooper-Wade sur, NE cor of N W ¼ of Sec 3. Magnolia Pet. Co., Dallas, L. L. Hudson 5, S 80, Club Ranch sur, 300 ft E of No. 4. Runer & Bailey, Waggoner Bldg., Wichita Falls, J. R. Parkery 1, B 1 SP RR sur, 170 ft to S and E lines. Gulf Prod. Co., Fort Worth, Turbeville 1, R. Carson sur, 150 ft to E and S lines.

Brown County—G. P. Mitcham, 406 Ave. I, Cisco, J. M. Perry 6, Honeycut sur, 300 ft E of No. 4; 4, 214 ft S of No. 3; 2, 222 ft S of No. 1. Williamson & Veale, Box 365, Brownwood, D. C. Woolridge 3, 300 ft N of No. 2; 4, 300 ft N of No. 3. J. A. Price, Okmulgee, Okla., A. P. Garritt 1, S. Bootsford sur, 5000 ft to N and 2040 to E line. L. H. Wentz, Eastland, J. W. Shore 2, S 625 C. S. Betts sur, 2020 ft to N and 175 ft to W line. Pandem Oil Corp., Wichita Fall, R. L. Westerman 6, N. B. Mitchell sur, 150 ft to S and 450 to E line. Humble Oil & Ref. Co., Cisco, Kilgore "D" 8, J. Delgas sur 375 ft W of No 5. Tom M. Lendon, Brownwood, A. D. Byrd 21, N Sherrod sur, 750 ft to E and 450 ft to S line. Mid-West Exploration Co., Coleman, Coleman, M. J. Suttles, 16, R. Mitchell sur No. 140, 300 ft S of No. 11. Pandem & Gilman, Box 42, Cisco, J. M. Perry 1, J. G. Rhea sur, B 36, 150 ft to N and W lines. W. V. Lester, Hall St., Dallas, M. E. Fry 7, J. Chandoin sur, S 621, 450 ft to N and 150 ft to E line; 8, 750 ft to N and 150 ft to E line. Anna Belle Oil Co., Cisco, W. H. Kilgore 7, S 152 H. McClure sur, 200 ft E of No 3. States Oil Corp., Eastland, D. C. Wooldridge 13, S 157 ET RR sur 288 ft W of No. 10. The Texas Co., Fort Worth, R. Hickman 5, T. Bens sur on S 783, 300 ft E of No. 3. J. S. Cosden, Inc., F&M Bldg., Fort Worth, R. L. Westerman 3, E 60 acres N. B. Mitchell sur, 300 ft W of No 2.

Bexar County—Helvetia Oil Co., San Antonio, M. J. Klemcke 9, A. McSynder No. 272 sur, 200 ft to N and E lines.

Callahan County—H. I. Stock, Cisco, J. T. Woods 1, S½ NW¼ B 2277 TE&L sur 900 ft to W and 150 to S line; 8, S½ SW¼, 750 ft

to W and 150 ft to St line; 7, S½ SW¼, 450 ft to W and 150 ft to S line. Prairie Oil & Gas Co., Ranger, R. Cunningham 9, S 73, CCSL sur, 150 ft W of No. 3. A. G. Webb 1, G. M. Vigal sur, 150 to N and 2081 ft to E line. T. E. Davis, et al, Vernon, A. J. Olson 15, S 3, GCSF RR sur, 300 ft N of No. 8. J. H. John 5, S 19, B O H sur 300 ft S of No. 4 Warren-Hayes Oil Co., Cisco, Seale 1, S 130, BBB&C sur, 150 ft to S and E lines. Moutray Oil Co., Abilene, J. A. Flores 3, S 149, BBB&C sur, 150 ft to N and W lines. J. M. Flores 5, S 140, BBB&C sur, 150 ft to W and 450 ft to S line. Payton & Payton, Mexia, M. M. Isenhower 1, BOHS 6, 150 ft to S and 750 ft to E line. Phillips & Milam, Chelsea, Okla., Isenhower 8, S2273, TE&L sur, 50 ft to E and 1350 ft to S line. Culberson & Dalton, Moran, S. S. Diller 3, S 48, LAL sur, 300 ft S of No. 1, Shackelford Oil Co., Putnam, M. A. Thomason 2A, S 2270 300 ft W of 1A, L. A. Warren, et al, Box 576, Cisco, E. A. Hearn 1, S 129, BBB&C sur, 150 ft to S and E lines. Nokes-Green et al, Cross Plains, A. Rudloff 1, B 37, CCSL sur, 150 ft to S and 600 ft to E line. Pet King, Putnam, W. M. Moore 3, S 3, GCSF sur, 150 ft to N and E lines.

Coleman County—Sunflower Pet. Co., Coleman, J. W. Gates 5, S 736, S. Crooks, 300 ft S of No. 2. Amerada Pet. Corp., Cisco, J. W. Harris 103, B 7, J. Sanders sur, 440 ft E of No. 98. Archie Shaw, Burkett, W. T. Burns, 17, A. Wickson sur, 2550 ft to N and E lines.

Cooke County—C. C. Lanier, Gainesville, A. Hyman 9, T. J. Moss, 300 ft E of No. 3; 8, 300 ft E of No. 4. Lynch, Stahl & Burress, Ardmore, Okla., D. Dangelmayr 3, G. Ivy sur, B 17, 300 ft S of center of NW¼ B 17. John W. Hooser, Thomas Bldg., Dallas, J. A. Dennis "B" 2B, S. Hernandez sur, 300 ft N of No. 1. Harry Hanbury, Box 107, Duncan, Okla., E. Fette 1, D. H. Campbell sur, 287 ft to W and 444 ft to S line. Sun Oil Co., Dallas, A. Hyman 7, T. J. Moss sur, 300 ft W of No. 7.

Crane County—The Texas Co., Fort Worth, R. King 12, S 85, B x CCSD&RGNG sur, 990 ft to N and 330 ft to W lines; 11, 330 ft to N and 990 ft to W lines. Simms Oil Co., Dalls, Univ. Lds. A1, S 39, 300 ft to N & E lines.

Caldwell County—Magnolia Pet. Co., Dallas, O. F. Starr 14, J. Henry sur, 300 ft SW of No. 9.

Eastland County—Mark Curtis, Fort Worth, M. W. Cade 1, B 22, J. Roberts sur, 660 ft to S & E lines. West Adams Pet. Corp. of Texas, Eastland, Hansauer 1, S 38, B 4, H&TC sur, 1150 ft to N and 1050 ft to W line. The Texas Dev. Co., et al, Box 1065, Eastland, J. S. Lewis 1, S 44, B 4, H&TC sur, 750 ft to N and 250 ft to E line.

Fort Bend County—Gulf Pro. Co., Houston, Beard 1, sur 111, 175 ft SW along S form SE cor 200 SE; B. Barrett 8, B g, E. Drew sur, 500 ft to W and 50 ft to S line.

Freestone County—J. S. Cosden, et al, Fort Worth, J. W. Woods 1, M. De Cantona sur, 150 ft to S & W lines.

Hutchison County—Phillips Pet. Co., Bartlesville, Okla., M. George 3, S 26, B 47, H&TC sur, 330 ft to N & 997 ft to E line. G. E. Martin 7, S 1 B xo 2, H&OB sur, 995 ft to E and 330 ft to S line; 6, 330 ft to W & S lines. I. W. Easter 3, S 69, B 46, H&TC sur, 330 ft to W and 995 ft to N line, A. Tennie 2, S 71, B 46, H&TC sur, 295 ft to E and 330 ft to S line; C. A. Patburg 4, S 67, B 46, H&TC sur, 330 ft to S & E lines. Gulf Prod. Co., Fort Worth, Whittenburg "D" 3, S2, Bxo2, H&OB sur, 330 ft to E and S lines. B. B. Johnson 13, S 66, B 46, H&TC sur, 660 ft N of No. 8. C. L. Dial 38, S 9, B z, GCSF sur, 678 ft E of No. 12. McMan Oil Co., Tulsa, Okla., Servey-Holmes 9, S 5, By M&C sur, 683 ft to N & 709 ft to W line. Phillips & Currie, Panhandle, H. E. Smith 2, S 14, By, M&C sur, 330 ft to N and W lines.

Hardin County—Lake View Oil Co., Sour Lake, Hardin Co. 51, S. Jackson sur, 225 ft to N of nearest well. Gulf Prod. Co., Houston, M. McLean "D" 2, S. Jackson sur, 40 ft to E and 50 ft to N line. East Batson Oil Co., Box 154, Batson, State Land 14, Cohley sur, 136 ft to W and 50 ft to S line. T. S. Hyslop, Box 421, Sour Lake, J. A. Honter 1, lot 56, P. S. Griffith and S. Jackson sur, 12 ft to E and S lines. Sterling Oil Co., Batson, J. O. Hooks 5, Choate sur, 442 ft to S

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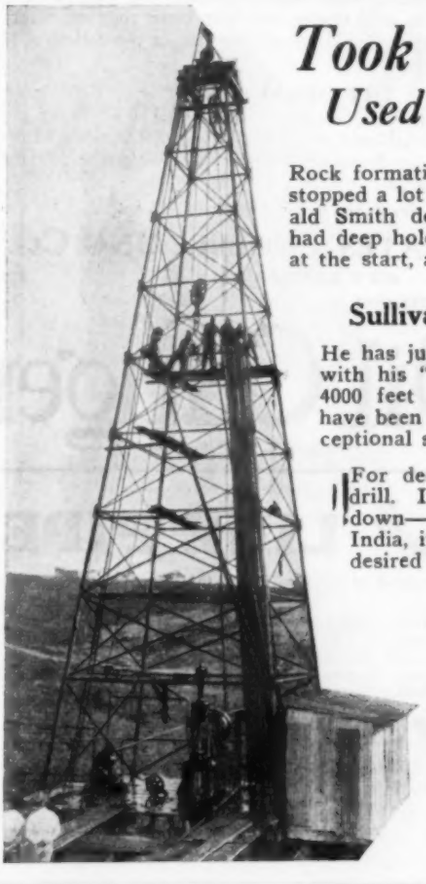

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and 75 ft to W line. F. C. Pope & A. W. Hodges, Saratoga, Buitsen "B" 1, B 16, CFS Jordit sur, 25 ft to N and W lines. Aerm Oil Co., Beaumont, Parafine 61, Knight sur, 50 ft to W and 193 ft to S line.

Harris County—Jadson L. Taylor, Trustee, Keystone Bldg., Houston, J. P. Danlin 1, J. Strange B 1, S 8-13, NE cor of blk. Unice & Carpenter, Box 669, Houston, Bullock & Nose 1, W. H. Jones sur, B 20, 50 ft to W in center. Humble Oil & Ref. Co., Houston, Gaillard Penn 32 W. Scott sur, 30 ft W of No. 10.

Jefferson County—Yount-Lee Oil Co., Beaumont, Y-L. Fee 12, B 5, Douthitt sur, 686 ft to W and 168 ft to S line. McFadden 16, P. Humphreys sur, 457 ft to N and 1278 ft to E line; 17, 305 ft to N and 1278 ft to E line; 18, 607 ft to N and 1278 ft to E line. Lord Mothner Oil Co., Beaumont, J. O. Banks 1, J. Douthitt sur, NE cor. Brooks Drilling Co., Beaumont, Young 1, S 15, T&NO. Atlantic Prod Co., Houston U. McLean 15, P. Humphreys sur, 95 ft to N and 120 ft to W line.

Jim Hogg County—Simms Oil Co., Dallas, C. Palacios 16, B b, S. Hendricks sur, 600 ft S of No. 14. Magnolia Pet. Co., Dallas, Merchant Bank 10, F. M. Brister sur, B 415, 300 ft W of No. 9. American Well & Pros. Co., Corsicana, C. Palacios 17, S 291, B3, 326 ft E to W ell 150 ft to S line.

Jones County—Landreth Prod. Corp., Howell 1, S 20, B 19, T&P sur, 330 ft to N and W lines.

Jack County—Buttram Pet. Corp., Oklahoma City, Okla., J. Preston 4, S Chairs sur, 500 ft to N of No. 3; 5, 360 ft N of No. 2. S. Cullers 1, 455 ft E of No. 2. C. K. Cullers 3, 455 ft W of No. 2.

Limestone County—E. L. Smith Oil Co., Mexia, J. Stenbenranch 1, P. Varela sur, 450 ft to S and 150 ft to W line. Pure Oil Co., Mexia, B. Atkins 4, P. Varela sur, 333 ft SW of No. 3. Transcontinental, Mexia, A. Medlock 5, P. Varela sur, 300 ft S of No. 3.

Liberty County—Republic Prod. Co., Houston, Dolbear 141, J. Devore sur, 2556 ft to N and 2287 ft to E line; 140, 4169 ft to N and 2102 ft to E line. Empire Gas & Fuel Co., Daisetta, Barngrover 22, J. Devore sur, 220 ft to S and 945 ft to E line.

Montague County—Texhoma Oil & Ref. Co., Wichita Falls, E. J. Bouldin "A" A 6, J. Chambliss sur, 150 ft to N & 665 ft to E line. N. J. Howard "A" 11, J. Chambliss sur, 150 ft to E and 750 ft to N line. J. W. Rowland "A" 10, J. Chambliss sur, 50 ft W of 6A. The Continental Oil Co., of Texas, Box 1001, Wichita Falls, J. W. Rowland 16, J. Chambliss sur, 205 ft to N and 691 ft to E line; 15, 205 ft to N and 450 ft to W line. Pure Oil Co., Mexia, J. W. Maddox 2, J. Chambliss sur, 400 ft W of No. 1. Gulf Prod. Co., Fort Worth, N. J. Howard 4, E. Votaw sur, 300 ft N of No. 2. The Texas Co., Wichita Falls, J. W. Maddox "A" 3, G. W. Thompson sur, 150 ft to N & E lines.

Milam County—Ellison Oil Co., Thorndale, J. P. Kevil 3, T. S. Arnett sur, 155 ft to N and E lines.

Matagorda County—Powers Prod. Co., Mason Bldg., Houston, H. Smith 3B, H. Parke sur, r B 5, 175 ft W of No. 8.

McMullen County—Healdton Oil & Gas Co., Enid, Okla., Franklin 1, S 31, Sur 385 center of 80 acres.

Navarro County—J. S. Cosden, et al, Fort Worth, J. H. Finch 1, W. H. Hardaman sur, B 12&13, 660 ft to N and E lines. O. N. Billings, Wortham, W. S. Evans 1, T. T. Curry sur, 150 ft to N and E lines.

Palo Pinto County—Britton, Gordon & Wickens, Strawn, Johnson 1, J. Bird sur, 1000 ft to W & and lines.

Potter County—Red Hill Pet. Corp., Amarillo, Canyon-Buffalo 4450, S 97, B5, BS&F sur, 1950 ft to W and 1370 ft to N line.

Panola County—Magnolia Pet. Co.'s Dallas, R. Johnson 3, J. Johnson sur, 330 ft to N and E lines.

Reagan County—Big Lake Oil Co., Texon, Univ. Texas 106, S 36, B 1, Univ. of Texas sur, 400 ft to N and 250 ft to E line.

Shackelford County—L. B. Tannehill, Albany,

R. J. Moberly 2, S 59, ET Ry sur, 300 ft E of No. 1; 3, same sur, 300 ft E of No. 2. P. S. Kendrick, Albany, Black Bros. 10, sur, 390, 150 ft to SE and 935 ft to SW line. Milham Corp., San Antonio, L. Clausell 15, S 582, TE&L sur, 1050 ft to E and 150 ft to N line. E. A. Engel, Albany, J. B. Matthews 2, S 29, ET Ry sur, 300 ft N of No. 1. Hyde & James, Albany, R. J. Moberly 1, Et Ry sur, S 59, 150 ft to N and E lines. C. J. Hodges, Albany, J. B. Matthews 2, S 29, ET Ry sur, 300 ft N and 300 ft W of No. 1. Skelly Oil Co., Tulsa, Okla., J. B. Matthews 2, S 31, ET Ry sur, 310 ft to N and 455 ft to E line. Cady Oil Co., Moran, R. E. Burns 13, S 68, L. A. sur, 300 ft E of No. 4.

Sterling County—J. Peter Williams, Mertyar, Clark 1, S 7, GCSF sur, 300 ft to N and E lines.

Stephens County—Barkley Conway & Gholson, Ranger, W. H. Bradford 1, S 49, B 6, T&P sur, 660 ft to S and W lines.

Taylor County — Sanger Oil & Ref. Co., Abilene, I. S. Brown 1, S 54, Blind Asy. Ld., 475 ft to W and 165 ft to S line.

Terry County—G. W. Gwinn, Slaton, R. Barrier 1, S 381, B I, J. H. Gibson sur, 1600 ft to S and W line.

Upton County — Roxana Pet. Corp., McCamey, F. S. Hughes 2, S 4, B 3, W. Teer sur, 250 ft to E and 1278 ft to S line; 3, same sur, 330 ft to W and 1992 ft to N line. Gulf Prod. Co., Fort Worth, J. H. Shirk 1, S 35, B 1, MK&T sur, 330 ft to S and 340 ft to W line. Atlantic Oil Prod. Co., Magnolia Bldg., Dallas, J. A. Dennis 1, S 35, MK&T sur, 330 ft to N and E lines.

Val Verde County—Douglass Oil Co., Atlas Bldg., Tulsa, Okla., Sellers 1, S 82, B A, I&GN sur, 1319 ft to E and 938 ft to S line.

Wichita County—Magnolia Pet. Co., Dallas, S. L. C. Heisenman 8, HT&B sur Nos. 1 and 2, 435 ft S of No. 7; C . F. Collins 10, L. C. Dennison sur, 400 ft W of No. 9; S. C. Ramming 25, TT Ry sur, opposite Marshall No. 7, same distance to line. Gulf Prod. Co., Fort Worth, H. S. Griffin 3, B 6, W. H. Spillers sur, 40 ft to W and 300 ft N of Pan. No. 1; 2, same sur, 300 ft SW of No. 1. Annie L. Witcher, Staley Bldg., Wichita Falls, Saunders 1, B 15, Ward & Todd sur, 50 ft to W and 388 ft to N line. Simms Oil Co., Dallas, W. H. Chilson 4, B 3, 300 ft E of No. 3. McClure & Sons, Iowa Park, W. D. McClure 1, S 5, B 5, GCSF sur, 1050 ft to W and 180 ft to S line. M. I. Henkel, Box 43, Burkburnett, Sunshine Hill 1, lots 141 and 153, B 4, W&T sur, N part of lot 141. C. R. Conyers, West Ida Ave., Electra, G. Jennings 7, S 12, H&TB sur, 300 ft W of No. 1. Wilson Drilling Co., Harvey Snider Bldg., Wichita Falls, R. Nitchke 1, B 15, DCSL sur, 150 ft to N and W lines. A. A. DeCamp, RFD 1, Box 84, Burkburnette, M. Evans 4, L. B. Taliaferro sur, 1185 ft to E and 168 ft to S line. Grayce Oil Co., Brown Bldg., Wichita Falls, J. B. Evans 15, J. B. Evans sur, B 818, 310 ft N of No. 16.

Webb County—Fathn & Cresswell, Laredo, J. H. Kirkpatrick 1, S 17, B 1, CCSD sur, 189 ft to N and 2640 ft to E line. Crown Central, Houston, Bruni 20, S 15, B 15, A. B. De Arriba sur, 450 ft to N and E lines.

Wilbarger County—Milham Corp. of Texas, San Antonio, Waggoner 18L, S 42, B 4, H&TC sur, 50 ft N of No. 11.

Wharton County—Ingram Prosp. Co., Houston, J. Kostelnic 3, S. F. Austin sur, 600 ft to SE and 200 ft to SW lines.

Young County—Roy I. Carter, Wichita Falls, S. M. J. Benson 18B, B 1450, TE&L sur, 300 ft S of No. 16; 19B, same sur, 300 ft W of No. 15; 20B, same sur, 300 ft E of No. 14. Madden & Hurt, Olney, Benson 11, B 1451, TE&L sur, 300 ft N of No. 9; 10, same sur, 400 ft to S and 300 ft NE of No. 7. Panhandle Ref. Co., Wichita Falls, I. E. Self 1, A. Rohus sur, 150 ft to W and 1050 ft to N line. Stafford & Hays, Graham, C. Keen 1, A. Rohus sur, 150 ft to N and E lines Roamer Oil Co., Wichita Falls, I. McClatchey 2, B 171, TE&L sur, 450 ft to W and 150 ft to S line. Schermerhorn Oil Co., Tulsa, Okla., Prideaux 1, ST Ry sur, S 1, 150 ft to N and E lines. Tidal Oil Co., Fort Worth, Benson 2, TE&L

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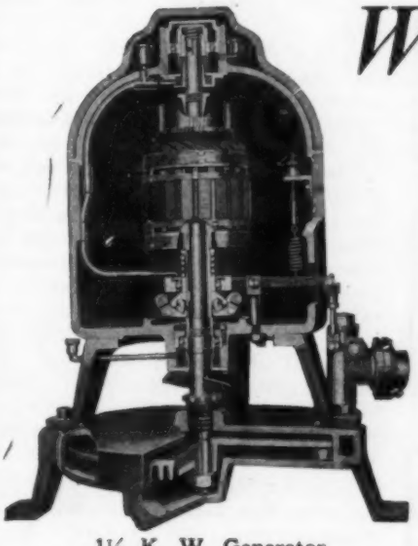

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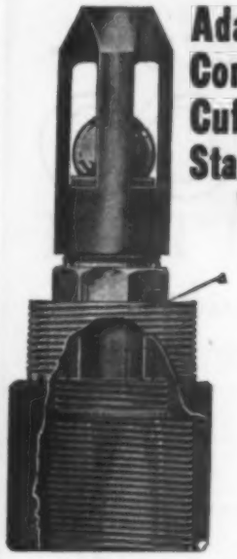

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A non-blowout valve used in wells where troubled with gas. It is screwed into an ordinary top cuff on the bottom of the working barrel, and having no leathers, it saves the resetting and turning of leathers as on the ordinary lower valve. Easier to Install, Lasts Longer. Sizes 1¼, 2¼, 2¾ and 3¾.

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sur, S 1451, 300 ft S of No. 3. Consolidated Oil Co. of Texas, Wichita Falls, Benson 15, TE&L sur, 300 ft E of No. 16. Bridwell & Mayfield, Wichita Falls, A. Williams 8, S 26, YCSL sur, 350 ft W of No. 7. Canyon Oil & Gas Co., Cross Plains, G. P. Stewart 1, D. Dawson sur, 150 ft to N and 1050 ft to E line. O. K. Pipe Threading Co., South Bend, R. J. Calvin 2, A. Rohus sur, 300 ft E of No. 1. Seaboard Oil & Gas Co. of Texas, Wichita Falls, J. W. Hughes 2, J. Abernathy sur, 200 ft to S and E lines. Robert Oil Corp., Breckenridge, G. P. Stewart 9, D. Dawson sur, 300 ft NW of No. 8.

Marland Stockholders Vote on Stock Increase

New York. — Stockholders of the Marland Oil Company are to meet November 1 to pass on the issuance of 20 per cent additional stock at $50 a share. A letter from E. W. Marland to stockholders has been interpreted as follows by the Wall Street Journal:

"In the judgment of your directors," he says, "it is proper that the preliminary cost of such work should be financed from earnings, but that periodically, as the results are realized, an opportunity should be given to the stockholders to invest additional capital in the company."

Stock to be issued will be underwritten by bankers and bring in about $19,000,000, making the company's working capital approximately $28,000,000.

Reserves of Crude Estimated

Stating that Marland's primary business has been production of crude oil and that geological and land departments have been highly developed to this end, Mr. Marland adds that officers believe the additions to proven reserves have justified mony expended. "The proven reserves are now estimated to be at least 260,000,000 barrels," he says, "and the reserves which will probably be developed by further testing of now unproven territory are estimated to be at least 150,000,000 barrels more. The company at present is producing from these reserves at the rate of 50,000 barrels a day, and there is every reason to believe that this rate will shortly be increased. The further growth of the company should continue along these lines and should be supplemented by adequate handling facilities."

Considerable sums also have been spent on manufacturing, marketing and transportation, the refinery having been increased to 25,000 barrels a day, while pipe lines are gathering and moving 75,000 barrels daily.

Sources and Disposition of Money

Regarding expenditures since the start of 1924, Mr. Marland states $52,200,000 went into properties as capital investment and $16,250,000 for retiring bonds and bank loans at the end of 1923. The total of $68,450,000, which excludes the sale and subsequent retirement of $20,000,000 two-year notes,

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All of Standard Pins and for DBX Casing.

Value of lot when new, about $150,000.

Desirous of disposing in one block or large quantities.

Will submit list if desired. Box 810, care of Oil Weekly, Houston, Texas.

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and the sources from which the money was derived, are given in the following table:

Expenditures

Retirement of debt and bank loans as of December 31, 1923	$16,250,000
Refinery, casinghead plants, pipe ilnes, marketing, etc.	18,300,000
*Acquisition of new leases and development of leases	39,900,000
	$68,450,000

Source Derived

Proceeds sale of stock	$25,200,000
Reserves against refinery, casinghead, pipe lines, marketing, etc.	5,775,000
Reserves against leases and development of leases	15,925,000
Surplus earnings after dividend	18,350,000
Miscellaneous	3,200,000

*These expenditures represent actual bonuses paid for leases and cost of drilling wells; do not include $7,421,000 currently charged against earnings for geological and investigation expenses in connection with lease acquisitions.

The total of $25,200,000 derived from the sale of stock arose from $22,400,000 received from J. P. Morgan & Co. in the purchase of treasury stock and $2,800,000 from subscriptions in exercising of stock warrants.

The special meeting of stockholders will vote on increasing authorized stock to 2,400,000 from 2,000,000 shares, and holders of record October 16 have the right to vote. Stock of record date on subscription privilege has not been announced yet.

Consolidated balance sheet of Marland Oil Company as of September 30, 1926, partly estimated and after giving effect to proposed financing, compares as follows:

Assets

	1926	†1925
*Fixed assets	$ 75,274,980	$ 62,170,441
Invest. and adv.	12,387,160	12,708,450
Cash	9,593,376	13,881,802
Bills and accts rec.	6,096,781	7,359,917
Crude oil	10,175,337	3,311,293
Refining prods.	5,161,776	3,507,049
Mat. and sup.	3,077,830	1,745,044
Misc. accd. items	50,063	182,695
Deferred items	1,644,751	1,629,712
Total	$123,462,054	$106,496,403

Liabilities

Cap. stock and sur.	$116,856,158	$ 94,670,125
Minority interest	22,291	139,466
Accounts payable	5,708,130	2,563,416
Misc. accrued items	361,891	437,146
Gold bonds	.....	7,798,000
Federal tax res.	413,584	.....
Equipment trust ctfs.	.....	507,000
Contingent res.	.....	381,250
Total	$123,462,054	$106,496,403

*After depreciation and depletion. ‡Represented by 2,311,316 no par shares. †Actual.

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Water and Waukeshas

Getting water into the fields is a task for which Waukesha "Ricardo Head" Oil Field Power Units are well known. Using it to keep it out is not so well known. Above is one of a 25 truck fleet all powered with Waukesha "Ricardo Head" Heavy Duty oil field type of engines owned by The Perkins Oil Well Cementing Co. of Los Angeles. They keep this fleet available 24 hours a day —seven days a week—for this service.

They use Waukesha equipped trucks because of their well known reliability. Getting a cementing rig to a new oil well also requires real power because of the roads that must be negotiated. Remember Waukesha "Ricardo Head" Engines and Oil Field Power Units are unusually reliable, low in fuel consumption and high in power. Write for "Oil Bulletin."

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NEW EQUIPMENT, CATALOGS, BULLETINS, BOOKS

Marion "Little Giant" Is For Shallow Wells

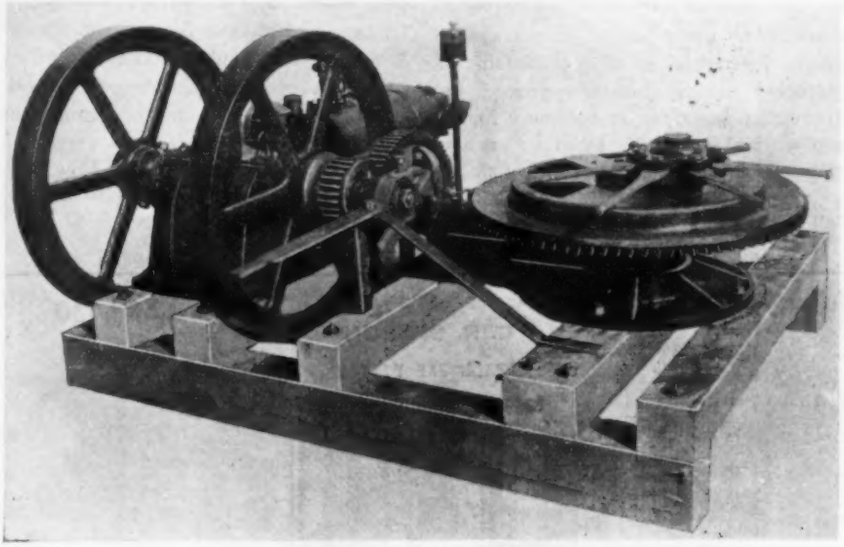
Apower designed for pumping light wells is being put on the market by the Marion Machine, Foundry and Supply Company, Marion, Indiana. The outfit is called Marion No. 80, "Little Giant" Power.

It is geared to connect with the Marion No. 10 h. p. engine. If desired the power can be disconnected and operated with a belt.

The unit is compact and will easily set in one of the small Marion metal engine houses. It is bolted to a heavy frame base and the whole equipment is ready to slide onto a foundaeion.

The outfit can easily be trucked from one lease to another, as occasion demands. It will handle from one to six shallow wells, and is said to be economical in operation.

Further information may be obtained from the company by writing for Bulletin No. 234.



Marion "Little Giant" Power

Safety Device Is Aid to Cable Drilling

A device which is said to insure greater safety in cable tool drilling by controlling the tug rope has been patented and is being introduced by Forest J. Lewis, 9928 Denison Avenue, Cleveland, Ohio.

The device consists of a framework which is made a part of the rig installation while the well is being drilled, set up as shown in the accompanying illustration. It is controlled by a rod under the derrick floor, which connects with a lever within reach of the driller.

Claims made for the device by the inventor include the following points:

1. The device insures greater safety by preventing the tug rope from slipping off the rim, etc.

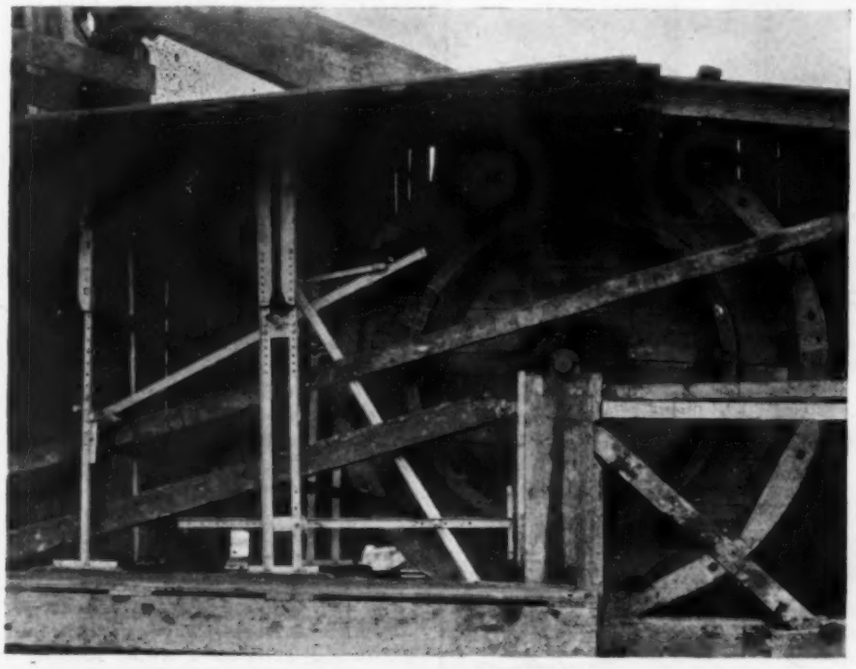
2. It reduces friction of the tug rope on the band wheel, insures a steady motion and helps the progress of drilling by giving the tools more fredom of action.

3 The device effects a saving of about 10 per cent in fuel.

4. It means about 50 per cent less wear on tug ropes.

5. It also cuts down the wear on wood tug rims.

More information about the device will be provided by the owner of the patent, upon request.



Safety device for controlling the tug rope in cable drilling

Bulletin on Standardized Pipe Sizes

New standard pipe sizes recommended by a joint conference of manufacures, distributors, and users, with the United States Department of Commerce, in May, this year, have recently been published by the National Tube Company, Pittsburgh, Pennsylvania.

Copies may be obtained by asking for New Standard Pipe Sizes, Simplified Practice Recommendation Wrought Iron and Wrought Steel Pipe Valves and Fittings.

Handy Oil and Gas Form Book Published

Dallas, Texas—The Mid-Continent Oil and Gas Form Book, a new publication is announced by the Post Publishing Company of Dallas, Texas.

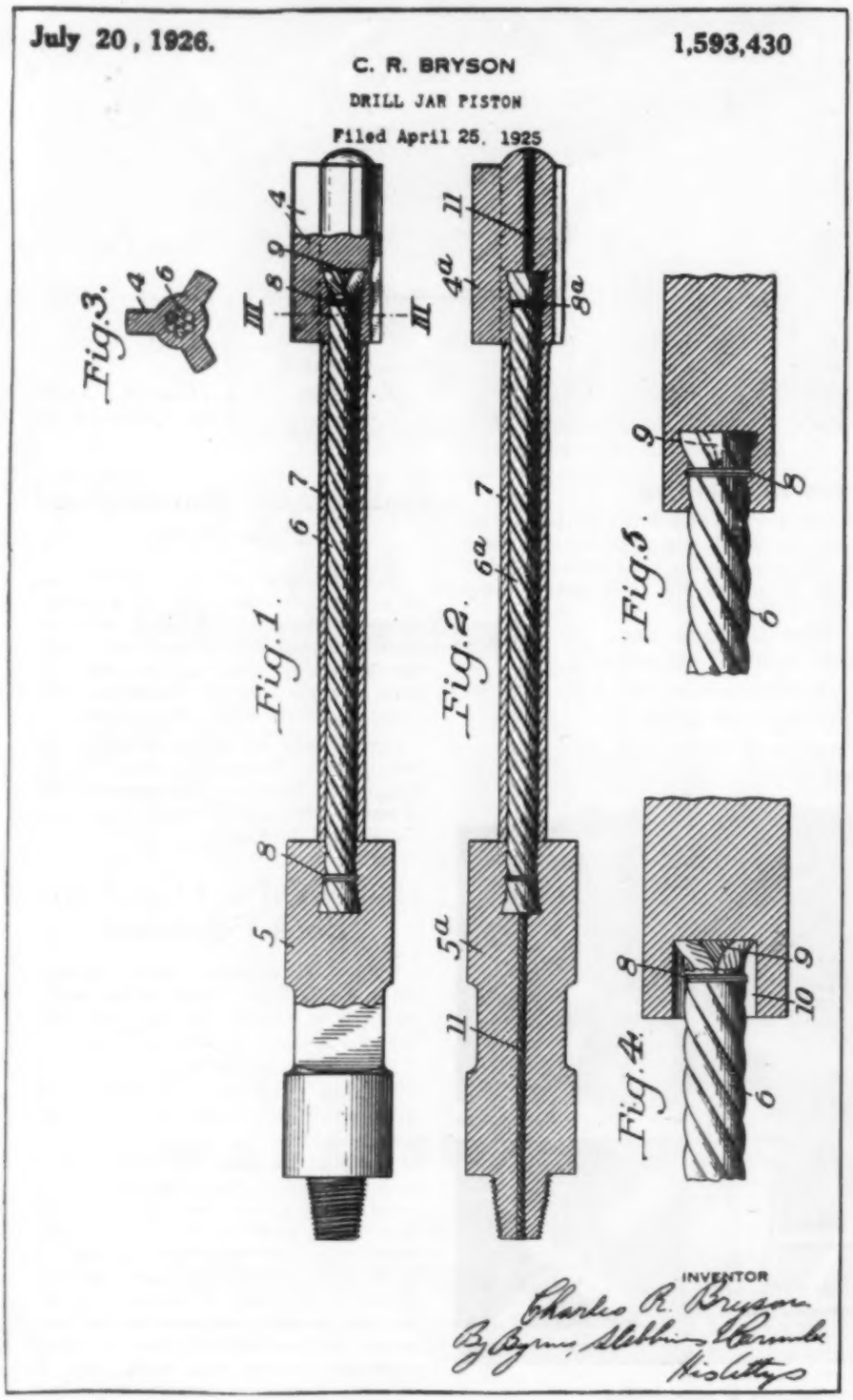
The authors are oil lawyers of Texas, Oklahoma, Kansas, Louisiana and Arkansas, which States the book covers.

The book contains complete sets of forms for each State, having all the usual lease, assignment and royalty forms, etc., and many special forms not obtainable elsewhere in printed form, such as surface leases, pick-up station leases, sale of unproduced oil, dry hole money contracts, bottom hole money assignments, contracts to shoot wells and control wild wells, etc. It includes forms not directly connected

with the oil industry but frequently used, such as curative title forms, quit claim deeds, liens, bills of sale, etc.

The book is designed for the use of oil lawyers, oil companies and operators, land men, scouts, brokers and others interested in the oil business. Statutory forms, forms approved by Supreme Courts, major company forms and forms accepted by long usage make up the book. Explanatory notes are given, offering suggestions on how and when to use the particular forms.

The authors are Bonner, Boaner & Fryer of Wichita Falls, Texas; Mason, Honnold, Carter and Harper of Tulsa, Okla.; L. P. Brooks, of Wichita, Kansas; Story & Phillips of Shreveport, La., and Gaughan & Sifford and Streett & Streett of Camden, Arkansas, all of whom have had wide range of experience representing major oil companies and operators. Printed on very thin paper, with flexible cover, the book can be conveniently carried in a portfolio in the field and sells for $7.50.



Bryson Drill Jar Piston Has New Features

Charles R. Bryson, 1211 Sheridan Avenue, Pittsburgh, Pennsylvania, has recently been granted a patent on a drill jar piston which is said to have several distinctive features, the most outstanding of which is that the connecting shank is formed of a flexible tension member.

The piston comprises a hammer portion or head and a body portion which are connected by means of a shank formed of a piece of wire rope having its ends embedded in the head and body portions. A metal sleeve surrounds the wire rope and protects it from abrasion. The sleeve abuts against the head and body portions to form a rigid spacer. It will thus be seen that the wire rope and the surrounding sleeve form a substitute for the usual integral shank portion of the piston.

Each end portion of the rope is tightly bound adjacent the extreme end thereof by means of a fine wire. The end portion of the rope is then expanded by driving a wedge of suitable material therein. The expanded portion of the rope is then inserted in a socket formed in the portion to which it is to be connected. Such portion is then forged down to a reduced cross-section, thereby firmly embedding the epanded end portion of the wire rope in such portion.

The wire rope has embedded therein a smaller wire rope which extends beyond the ends of the wire rope and has its projected end portions embedded in the hammer or head and body portions of the piston. It will be appreciated that with this construction, if the hammer portion of the body portion should become fractured, the embedded rope will serve to temporarily hold the parts together and thus enable the drill par to be drawn out of the well for repairs.

Further information may be secured from the owner of the patent, or from the Electro Steel Company, Pittsburgh, Pennsylvania.

Utah Leases Muddled

Salt Lake City, Utah.—The permit and lease situation in the state is far from clear, although in a much better state than two months ago. The recent government and bureau decisions have served a help matters in some instances and to complicate them in othres. Operators are not expected to show great enthusiasm until something definite is learned.

J. B. Steele, general manager of the Kewanee Oil & Gas Company, is taking a few days away from his office for a vacation over in Arkansas. The Kewanee Company is active east of the Burbank field, where it has four producing wells on a whole section, a mile east of Burbank production.

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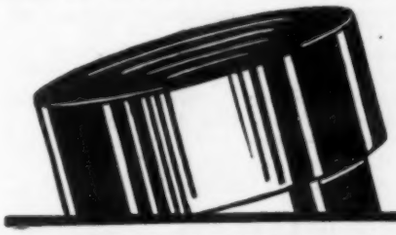

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SQUEAKS FROM THE BULL WHEEL

KEEP LIGHTS AND FIRES AWAY.

"What has become of your brother?" inquired a friendly mosquito.

"He met a terrible fate," answered the other. "Those human beings poured kerosene all over the place."

"But he likes kerosene."

"Yes, that was the trouble. He gorged himself with it and then collided with a lightning bug."

The Prodigy's Mother—Of course, I know she makes little mistakes sometimes; but you see she plays entirely by ear.

The Prodigy's Uncle—Unfortunately, that's the way I listen.—Passing Show.

Neverwed—What have you named the twins?

Yearwed—My husband wanted to name them Percy and Clarence, but on account of the noises they make we call them Static and Ecstatic.

Sign a tStandard Oil Co. Station—
"ETHYL IS BACK."
Sign across the street at National Refining Co. Station—
"ROSE NEVER WENT AWAY."

"OO-hoo! I saw you kiss Sis!" cried one of those ubiquitous small brothers, suddenly materializing from nowhere at all.

"Er-ah-here's a quarter, my little man," offered the embarrassed suitor.

"And here's fifteen cents change," countered the little man. "One price to all—that's the way I do business."

"Good Lord, man, that suit's big for you."

"That's all right, I come from Chicago."

"What d'ya men?"

"I'm a bigger man there than I am here."

The memory-training expert was lauding the merits of his system.

"Why not take a course in efficiency training?" said he. "I can show you how to earn more money than you are getting."

"I do that now!" said his victim morosely.

A Jew, whose son was very ill, on returning home one evening, inquired of his wife:

"How's poor Isaac, Esther?"

"Very bad indeed, Moses. He won't take any interest——"

"What?" broke in her husband. "Won't take any interest? He must be dead!"

Stump Orator—"I want reform; I want government reform; I want labor reform; I want——"

Voice—"Chloroform."

Girl—"Could you fix me a dose of castor oil so the oil won't taste?"

Druggist—"Certainly! Won't you have a glass of soda while waiting?"

Girl—"Oh, thank you." (And drinks the soda.)

Druggist—"Something else, Miss?"

Girl—"No, just the oil."

Druggist—"But you just drank it."

Girl—"Oh, dear! I wanted it for my mother."

"My razor doesn't cut at all."

"Why, George, you don't mean to tell me that your beard is tougher than the oilcloth I cut this morning?"

Patient's Wife: What is it, Doctor? Anything contagious?

Doctor: Oh, no, just a bad case of Scotch.

Anxious to Please

Grocer (to boy): "H'm! So you want a job, eh? Do you ever tell lies?"

Youngster: "No, but I'm willing to learn."

World Power

Chauncey M. Depew was talking on his recent birthday about the vast number of youthful marriages that have taken place this year.

"It's the short skirt," he said. "The short skirt does it. There has never been anything like the short skirt for making young men fall in love."

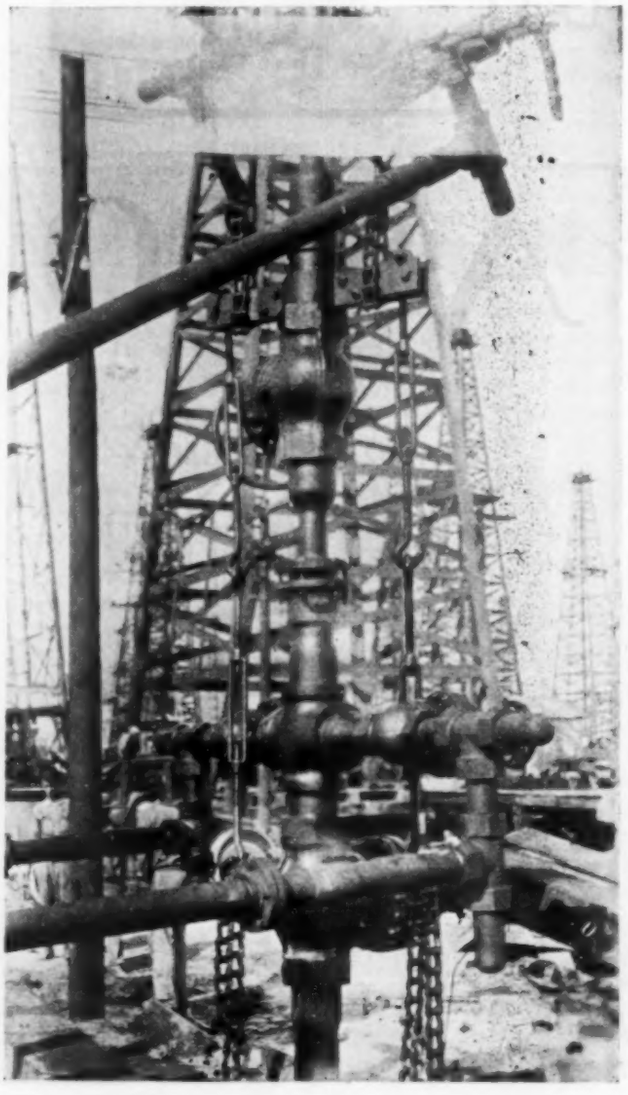
Then he sighed and added:

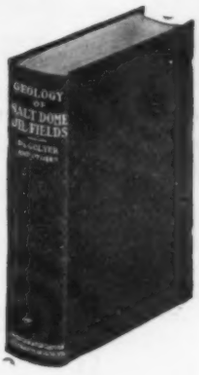
"Calf love."

Dear Editor:

Very often I see reference in your paper to the "Christmas tree." Being a stenographer in an oil office it may not be necessary for me to know, but I would like to. Will you tell me? Mary S.

Here is a picture which illustrates it very well, although the camera used was not entirely adequate for the purpose, as it would not reach so high as this tree goes. It is on a well of the Atlantic Oil Producing Company at Spindle Top, and there is some talk of housing it in as protection against the elements, the idea being to preserve it permanently as an example of the pipe-fitters' art. It has also been suggested by operators on adjoining leases that such a covering would permit charging admission to see it. This particular assembly of fittings and valves has been made basis of "deep as a tree' in referring to the depth of deep wells in that area.





An Official Publication of
The American Association of Petroleum Geologists

Geology of Salt Dome Oil Fields

A Symposium on
The Origin, Structure, and General Geology of Salt Domes, With Special Reference to Oil Production and Treating Chiefly the Salt Domes of North America

By

E. DeGolyer, W. A. J. M. Van Waterschoot Van der Gracht, Marcus I. Goldman, I. P. Voitesti, S. L. Mason, Hans Stille, Donald C. Barton, Sidney Powers, W. C. Spooner, Dave Donoghue, Francis Edward Vaughan, R. H. Goodrich, Lyman C. Reed, P. K. Kelly, H. E. Minor, Roland B. Paxton, A. S. Henley, John R. Suman, George Sawtelle, George M. Bevier, W. F. Bowman, Alexander Deussen, Laura Lee Lane, D. S. Hager, E. Stiles, Paul L. Applin, William Kennedy, Albert G. Wolf, Ben C. Belt, W. P. Henniger.

EDITED BY RAYMOND C. MOORE

With Assistance of Wallace E. Pratt, Donald C. Barton, Alexander Deussen, J. P. D. Hull

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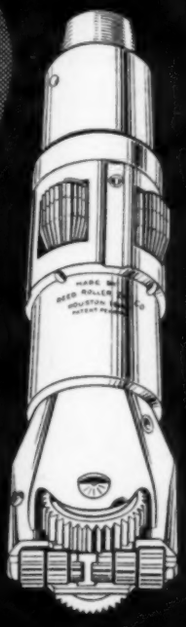

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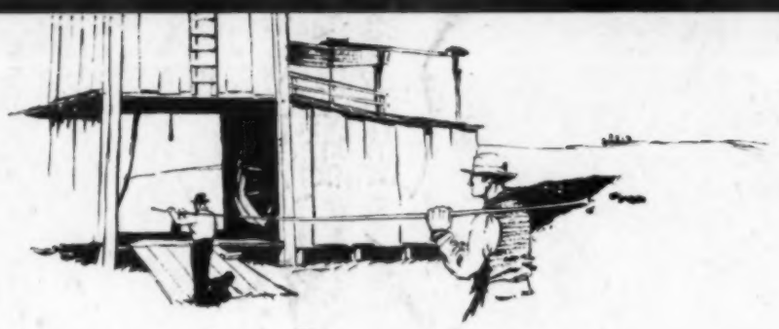

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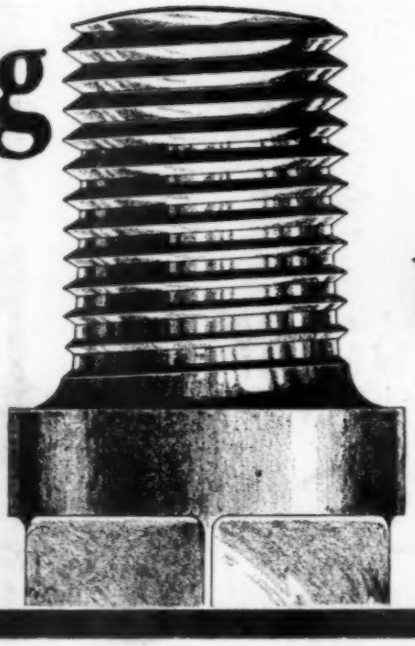

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